The effects of high protein diets on thermogenesis, satiety and weight loss: a critical review

Halton T L, Hu F B

CRD summary
The authors concluded that higher protein diets might increase weight loss in the short term, but further longer term research is required before definitive conclusions can be drawn. The limited search, lack of a validity assessment and poor reporting of review methods mean it is difficult to assess the reliability of these conclusions.

Authors' objectives
To determine the efficacy of high-protein diets on dietary thermogenesis, satiety, body weight and fat loss.

Searching
MEDLINE was searched for studies published in the English language; the search terms were reported. The reference lists of relevant reports were also screened.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) were eligible for inclusion in the review; crossover design and parallel-group trials were included.

Specific interventions included in the review
Studies that compared a relatively high protein diet with a lower protein diet were included in the review. Where studies compared the high-protein diet with more than one other diet, the comparison selected was high-protein versus high-carbohydrate diet. The included studies compared a variety of different higher and lower protein diets (details were reported).

Participants included in the review
Inclusion criteria for the participants were not specified. The participants in the included studies varied considerably: healthy men and women, obese patients, obese hyperinsulinaemic and diabetic patients, older patients, the elderly and children.

Outcomes assessed in the review
It was clear that studies that assessed dietary thermogenesis, total weight change, total body fat change, satiety and subsequent energy intake after an isocaloric load were eligible for inclusion. The included studies used a variety of outcomes measures to assess thermogenesis (details were reported).

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction. For each study, outcome measures of interest were extracted along with levels of statistical significance.

Methods of synthesis
How were the studies combined?
The studies were grouped by outcome and combined in a narrative.

How were differences between studies investigated?
Differences between the studies were apparent from the tables and text. Potential reasons for differences in the results of studies assessing weight loss were discussed.

Results of the review
Forty-eight studies, with 50 outcome comparisons, were included in the review. Fifteen RCTs (n=187) assessed thermogenesis, 20 RCTs (n=361) assessed satiety and subsequent energy intake, and 15 RCTs (n=720) assessed weight and fat loss.

A number of additional studies and reviews that assessed renal function, blood lipids and cardiovascular disease risk were also discussed, but it was unclear whether these formed part of the systematic review; these results were not considered in this abstract.

Thermogenesis (15 studies).
The duration of most studies was 6 to 7 hours (range: 2 to 36). Ten of the RCTs were crossover studies. Only 2 studies involved more than 15 participants. All 6 studies that assessed the thermic effect of food as a percentage of ingested energy reported a greater energy expenditure for the higher protein versus the lower protein diet. All 3 studies reporting the thermic effect in kilojoules reported a significantly greater effect for higher protein versus higher fat or higher carbohydrate meals. All 6 studies that used a variety of other measures to assess the thermic effect reported increased effect for higher protein diets.

Satiety (14 studies).
Most of the studies were of a crossover design. The duration of the studies ranged from 2 minutes to 15 days. Eleven of the 14 studies that compared high protein with at least one other macronutrient reported that a protein pre-load significantly increased subjective ratings of satiety; the remaining 3 studies reported no difference between higher and lower protein pre-loads.

Subsequent energy intake (15 studies).
Eight of the 15 studies reported a significant decrease in energy intake after a higher versus a lower protein pre-load; the other 7 studies reported no significant differences between higher and lower protein pre-loads. Total weight loss (15 studies).
The duration of the studies ranged from 7 days to 1 year. Most used a fixed energy intake. Seven of the 15 studies reported a significantly greater weight loss with a higher protein diet. Five of these studies were of longer duration (6 months or more) and two were of shorter duration (few weeks).

Eight studies reported no significant difference in weight loss between higher versus lower protein diets. Four of these studies were of short duration (10 weeks or less) and had small sample sizes (n=6 to 35); the other four were of longer duration (12 weeks or more).

Total fat loss (10 studies).
Three of the 10 studies reported a statistically significant greater fat loss with higher versus lower protein diets.

Authors’ conclusions
Higher protein diets might increase weight loss in the short term, but further longer term research is required before definitive conclusions can be drawn.
CRD commentary
The review addressed a clear question that was defined in terms of the intervention, outcomes and study design; inclusion criteria for the participants were not defined. Limiting the search to English publications listed in one database was likely to have led to the omission of other relevant studies and raises the possibility of publication and language bias. The methods used to select studies and extract the data were not described, so it is not known whether any efforts were made to reduce reviewer errors and bias. Study validity was not assessed, thus the results from these studies and any synthesis might not be reliable. In view of the differences between the studies, the narrative synthesis was appropriate. The limited search, lack of a validity assessment and absence of details of review methodology mean it is difficult to assess the reliability of these conclusions.

Implications of the review for practice and research
Practice: The authors stated that it might be useful to partially replace refined carbohydrate with proteins that are low in saturated fat.
Research: The authors stated that there is a need for rigorous longer term studies to evaluate the effects of high-protein diets on weight loss and weight maintenance.

Funding
National Institutes of Health, grant number HL60712.

Bibliographic details

PubMedID
15466943

Original Paper URL
http://www.jacn.org/

Indexing Status
Subject indexing assigned by NLM

MeSH
Diet Fads; Dietary Proteins /administration & dosage; Energy Metabolism /drug effects /physiology; Humans; Lipids /blood; Obesity /diet therapy; Satiety Response /drug effects; Thermogenesis /drug effects; Weight Loss /drug effects

AccessionNumber
12005003528

Date bibliographic record published
31/07/2007

Date abstract record published
31/07/2007

Record Status
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.