Nutritional support in chronic obstructive pulmonary disease: a systematic review and meta-analysis

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CRD summary
The authors concluded that nutritional support, mainly in the form of oral nutritional supplements, improved total intake, anthropometric measures and grip strength in chronic obstructive pulmonary disease (COPD). The authors’ conclusions reflect the evidence presented but poor quality studies and unreported heterogeneity mean that caution is warranted when interpreting these results.

Authors’ objectives
To examine the efficacy of nutritional support in improving intake, anthropometric measures and grip strength in patients with stable COPD.

Searching
PubMed and Web of Science databases were searched up to January 2010 for studies published in English. Search terms were reported. Previous reviews and references lists from identified trials were handsearched.

Study selection
Randomised controlled trials (RCTs) that compared nutrition support with placebo or no intervention in patients with stable COPD were included. Intervention duration had to be greater than two weeks. Studies that used parenteral nutrition were excluded.

The outcomes of interest were total nutrient intake (energy and protein), body weight, upper arm anthropometric measures, body composition and hand grip strength. Eight studies were conducted in an outpatient setting, three in an inpatient setting and two in both outpatient and in-patient settings. Patients in the trials had a stable COPD (<70% predicted forced expiratory volume in one second) and free from exacerbation. Patients were classified as having severe COPD where predicted forced expiratory volume was between 30% and 40% in one second. Types of interventions included food strategies, dietary advice, oral nutritional supplements and enteral tube feeding. Both nourished and malnourished patients were included in the trials. Malnutrition was considered to be present if the mean BMI (body mass index) was less than 20 or the mean percentage ideal body weight was more than 90%. The intervention ranged from 16 days to six months. The amount of nutritional support prescribed ranged from 355 kcal/day to 1,280 kcal/day.

Two reviewers were involved in study selection. Any disagreements were resolved through discussion with a third reviewer.

Assessment of study quality
The Jadad scoring system was used to assess quality to give a score of up to 5 for randomisation, blinding and withdrawals/drop-outs.

Two reviewers independently evaluated study quality. Any disagreements were resolved by discussion with a third reviewer.

Data extraction
Means and standard error were used to calculate mean differences (MD) with 95% confidence intervals (CIs). The effect sizes were expressed as differences in mean ± standard error (SE). Where only mean values were reported, standard deviation and standard error were calculated by using reported p value. Where data were not reported in the text but illustrated within figures, data were extracted from the figures. It was not clear how many reviewers performed the extraction.

Methods of synthesis
A random-effects model was used to combine studies to calculate effect sizes and standard error. Subgroup analysis was performed according to type of nutritional support and baseline nutritional status (nourished or malnourished). Meta-regression analysis was used to investigate whether the duration or amount of the intervention influenced the effect size for each outcome. Publication bias was assessed using funnel plots and Begg and Mazumdar and Egger tests.

Results of the review
Thirteen RCTs (439 patients) were included in the review. Interventions were dietary advice (one RCT), oral nutritional supplements (11 RCTs) and enteral tube feeding (one RCT). The quality assessment showed three studies were of higher quality (Jadad score 4 or 5) and 10 were of lower quality (Jadad score less than 3). There was no evidence of publication bias.

There was a significant increase in mean total protein and energy intakes with nutritional support of 14.8g ± 3.6 (p<0.001; two studies) and 236 kcal ± 71 (p<0.001; five studies) daily. Meta-analysis showed greater mean improvements in favour of nutritional support for body weight (MD ± SE = 1.83kg ± 0.26; p<0.001; eight studies), grip strength (MD ± SE = 5.3% ± 2.7%; p<0.05; four studies) and skinfold thickness based on the sum of four skinfold sites (MD ± SE = 1.2mm ± 1.2; p<0.001). Further results were reported.

Subgroup analysis of nourished and malnourished showed significant increase of weight in favour of the interventions. Meta-regression did not show a significant relation between the magnitude of the weight increase, percentage ideal body weight at baseline, target intake from the nutritional intervention and duration of intervention.

Authors' conclusions
The authors concluded that nutritional support, mainly in the form of oral nutritional supplements, improved total intake, anthropometric measures and grip strength in COPD.

CRD commentary
The review addressed a clear question supported by appropriate inclusion criteria. Searches included relevant databases. Only studies published in English were eligible so language bias could not be ruled out. Publication bias seemed unlikely. Appropriate methods were used to reduce reviewer error and bias during study selection and quality assessment; methods used for data extraction were unclear. A valid tool was used to assess studies for quality.

Meta-analysis was appropriate but the authors did not report the statistical heterogeneity between studies. The authors noted some limitations of the review that included poor quality of the included studies.

The authors' conclusions reflect the evidence presented but poor quality studies and unreported heterogeneity mean that caution is warranted when interpreting these results.

Implications of the review for practice and research
Practice: The authors did not state any implications for practice.

Research: The authors stated that further studies should examine the interactions that probably exist between nutritional supplementation and factors such as malnutrition, inflammatory status and graded physical activity in both stable disease and infective exacerbations of COPD.

Funding
None.

Bibliographic details

PubMedID
22513295

DOI
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.