Behavioral intervention to promote smoking cessation and prevent weight gain: a systematic review and meta-analysis


CRD summary
This review found no evidence that smoking cessation plus behavioural weight-control interventions produced harm and found evidence of short-term benefit in abstinence and weight control. The included trials were of limited quality and the reliability of these conclusions is unclear. The lack of evidence of harm might be overstated as the authors only investigated diminished abstinence and increased weight gain.

Authors' objectives
To determine whether behavioural weight-control interventions affected smoking cessation attempts and whether they were effective in reducing weight gain after cessation.

Searching
PubMed, CINAHL, EMBASE, PsycINFO, Cochrane Database of Systematic Reviews, and Cochrane Central Register of Controlled Trials (CENTRAL) were searched to August 2007 for studies published in English. The search terms were not reported. Online in-press journal articles were sought in July 2007 and November 2007. The reference lists of retrieved papers and a relevant Cochrane review were also searched.

Study selection
Randomised controlled trials (RCTs) of men or women (aged 18 to 70 years), who identified themselves as regular smokers, of any ethnicity, were eligible for inclusion if they assessed behavioural interventions that addressed both smoking cessation and weight gain prevention compared with those that addressed smoking cessation alone. For inclusion trials had to report data on both smoking cessation and weight gain outcomes and have at least one month of follow-up. Trials that included nicotine replacement therapy or other pharmacotherapies were only included if the identical drug therapy was used in both the behavioural intervention arm and the control treatment arm.

The mean age of the included participants ranged from 37.5 to 46.9 years and the majority of them were female and Caucasian, where reported. The mean number of cigarettes smoked per day ranged from 19.5 to 28 and the mean body mass index (BMI) was between 24.1 and 27.4kg/m². The intervention and control programmes varied, but most of them had a counselling component and most of these used cognitive-behavioural methods.

Assessment of study quality
Methodological quality was assessed using a modified Physiotherapy Evidence Database (PEDro) scale to give a composite quality score out of nine.

Trial quality was assessed by two reviewers and disagreements were resolved by consensus.

Data extraction
Odds ratios for smoking cessation or Hedges’ g for weight gain after cessation and corresponding 95% confidence intervals in the short-term (less than three months) and in the long-term (more than six months) were extracted. If a short-term data point was not reported, data for up to four months were used; for the long-term the latest follow-up assessment after six months was used. When a study reported more than one assessment that met the criteria for either long- or short-term assessment the latest time point was used. Abstinence from smoking was coded either as continuous (abstinence between initial quitting and the follow-up assessment) or seven-day point prevalence (abstinence during the week prior to assessment); if both measures were available continuous abstinence was used. Weight gain was coded either for all participants randomised to treatment or abstainers only; if both were available the former was used.
The data were extracted by two reviewers and disagreements were resolved by consensus.

**Methods of synthesis**
Odds ratios or Hedges' g were pooled in random-effects meta-analyses. Heterogeneity was investigated in sensitivity analyses for long- and short-term outcomes and continuous abstinence and point prevalence for smoking cessation. Subgroup analyses were performed for trials that evaluated all randomised participants and those that analysed only participants who abstained from smoking. Meta-regression was performed to examine any relationship between treatment effects and trial quality. Publication bias was assessed using funnel plots and the Egger test and the Rosenthal method was used to calculate fail-safe N.

**Results of the review**
Ten RCTs were included in the review (n=2,233 participants; range 20 to 417). PEDro scores ranged from five to eight. Combined smoking plus weight-control treatment was associated with significantly higher short-term abstinence (OR 1.29, 95% CI 1.01 to 1.64) and reduced short-term weight gain (g -0.30, 95% CI -0.57 to -0.02) compared with smoking treatment alone; there was no significant difference between treatments for long-term abstinence and long-term weight gain.

Sensitivity analyses reported similar results within the defined subgroups. Publication bias was unlikely; Egger test p-values ranged from 0.06 to 0.33 and the fail-safe N was 13 trials for smoking cessation and 38 trials for weight gain.

**Authors' conclusions**
There was no evidence that combined smoking cessation and behavioural weight-control interventions produced any harm and significant evidence of short-term benefit in both abstinence and weight control.

**CRD commentary**
The research question was supported by clear inclusion criteria. Only trials published in English were sought, so neither publication bias nor language bias could be ruled out, but tests for publication bias suggested it was not present. Trial selection, data extraction and trial quality assessment were performed by two people, which reduced the risk of reviewer error and bias.

Trial quality was assessed and taken into consideration and some aspects of heterogeneity were investigated. The authors stated that these findings might only be generalisable to women. The synthesis using meta-analysis appears to have been appropriate.

The lack of high-quality primary trials means that the reliability of the authors' conclusions is unclear. The conclusion that combined smoking cessation and behavioural weight-control interventions did not produce any harm might have been an overstatement as the authors only investigated two specific harms: diminished abstinence and increased weight gain.

**Implications of the review for practice and research**
**Practice:** The authors stated that the lack of evidence of long-term benefit in either smoking cessation or weight control from these time-limited intervention trials did not justify expenditure on weight gain prevention treatment for patients who stopped smoking.

**Research:** The authors stated that testing of whether more extended behavioural weight control treatment produces long-term benefit for smoking cessation and weight gain is needed.

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