Gum chewing reduces postoperative ileus? A systematic review and meta-analysis
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CRD summary
The authors concluded that chewing sugarless gum after elective intestinal resection was associated with improved outcomes. There was insufficient evidence to determine the clinical complication rate and costs. There were limitations to the review, but overall the authors’ conclusions are likely to be reliable.

Authors' objectives
To evaluate the benefits and harms of chewing gum after elective intestinal surgery.

Searching
PubMed, EMBASE and Cochrane Central Register of Controlled Trials (CENTRAL) (issue 2, 2006) were searched; search terms were reported; search dates other than CENTRAL were not reported. A Google search was conducted. Reference lists from eligible studies were screened. Chewing gum companies were contacted for details of unpublished studies.

Study selection
Randomised controlled trials (RCTs) that compared chewing gum with not chewing gum in addition to standard post-operative care in patients who underwent elective intestinal surgery were eligible for inclusion.

In all studies, sugarless chewing gum was administered from the morning of the first postoperative day. Gum regimens varied and included three times a day until oral intake, solid food or hospital discharge and every two to four hours. Where reported, studies varied in their use of nasogastric tubes. Most studies were in patients who underwent various colonic or rectal procedures; some patients underwent laparoscopic resections. All but one of the studies were in adults (mean age 56 to 71 years); one study was in children (mean age approximately eight years). The review assessed time from the end of surgery to first passage of flatus and stool, clinical complications and length of hospital stay.

One reviewer screened titles, two reviewers screened potentially relevant abstracts and full papers and four reviewers made the final decision on study inclusion. It was unclear whether or not the reviewers worked independently.

Assessment of study quality
Two reviewers independently assessed validity by considering the method of randomisation generation, allocation concealment, blinding of outcome assessors and patients, inclusion and exclusion criteria, baseline comparability of treatment groups, calculation of required sample size and intention-to-treat analysis. Differences were resolved by discussion with the help of a third reviewer if required.

Data extraction
Two reviewers independently extracted continuous data as mean differences with 95% confidence intervals (CI). Discrepancies were resolved by consensus. If required, authors were contacted for additional data.

Methods of synthesis
Pooled weighted mean differences (WMD) and 95% CIs were calculated for continuous data using a random-effects model. Heterogeneity was assessed using the I² statistic. Publication bias was assessed using a funnel plot and Egger's asymmetry test. The pooled odds ratio (OR) and 95% CI was calculated for overall infections complications. The influence of one study with a large sample size and small standard deviation that dominated results was explored and other differences between studies were discussed.

Results of the review
Nine RCTs were included (n=437).

Study quality was suboptimal. In eight studies, patients were randomly allocated to treatment groups; in one study
consecutive patients were allocated to treatment groups. Four studies described allocation sequence generation, four reported allocation concealment, three reported blinding of the outcome, seven reported intention-to-treat analysis and three studies reported sample size calculation. Only one study adequately defined outcome measures. Details of factors known to influence postoperative ileus were poorly recorded.

Chewing gum was associated with a statistically significant reduction in the time to passage of flatus (WMD -14 hours, 95% CI -20 to -8; nine studies) and stool (WMD -23 hours, 95% CI -32 to -15; eight studies). In both analyses there was some evidence of statistical heterogeneity ($I^2=58\%$ and $54\%$).

Chewing gum was also associated with a statistically significant reduction in length of post-operative hospital stay (WMD -1.1 days, 95% CI -1.9 to -0.2; seven studies; $I^2=78\%$). Although all studies showed a beneficial effect, there was substantial heterogeneity.

Where reported, complications were uncommon and there was no evidence of a difference between treatments. There was no statistically significant difference between treatments in overall infections complications (the number of studies unclear).

The funnel plot and asymmetry tests showed no clear evidence of publication bias.

**Cost information**
The average cost of gum was reported as $0.60 per patients.

**Authors’ conclusions**
Chewing sugarless gum after elective intestinal resection was associated with improved outcomes, but there was insufficient evidence to determine the clinical complication rate and costs.

**CRD commentary**
The review addressed a clear research question supported by appropriate inclusion criteria. Several relevant sources were searched and attempts were made to minimise publication bias; the potential for publication bias was assessed and the authors’ correctly acknowledged the limitations of this assessment due to the small number of studies. Dates for the database searches were not reported and it was unclear whether attempts were made to minimise language bias. Methods were used to minimise reviewer errors and bias in the assessment of validity and extraction of data. Some details of methods used to select studies were reported, but it was unclear whether the multiple reviewers involved in the process worked independently or not. Only RCTs were eligible, but one of the included studies was poorly randomised. Validity was assessed and results were reported in full and taken into account when discussing the review findings. Appropriate methods were used for the meta-analyses, heterogeneity was assessed and differences between studies were discussed. There were discrepancies between numbers reported in forest plots and the text. There were limitations to the review, but overall the authors’ conclusions are likely to be reliable.

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

**Research:** The authors stated that rigorously designed and adequately powered clinical trials were required to evaluate chewing gum as an adjunct to early feeding in patients who underwent elective gastrointestinal surgery. Studies should examine the potential mechanisms of action of chewing gum and assess clinical complications such as the risk of infection as primary outcomes.

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