Meta-analysis: randomized controlled trials of 4-L polyethylene glycol and sodium phosphate solution as bowel preparation for colonoscopy

Juluri R, Eckert G, Imperiale TF

CRD summary
The authors concluded that adults taking sodium phosphate for bowel preparation prior to elective colonoscopy were more likely to complete the treatment and have an excellent or good preparation than adults taking polyethylene glycol. Evidence appeared to support the authors' conclusions, but inadequate assessment of trial quality and differences between trials mean that the reliability of the findings is unclear.

Authors' objectives
To compare the efficacy and tolerability of polyethylene glycol with sodium phosphate for bowel preparation prior to colonoscopy.

Searching
MEDLINE and EMBASE were searched from 1990 to 2008 for studies published in English. Search terms were reported. Reference lists of primary studies were screened. Studies published only as abstracts were excluded.

Study selection
Randomised controlled trials (RCTs) were eligible if they compared the effects of 4-L polyethylene glycol versus two 45 ml doses of sodium phosphate in adults undergoing elective colonoscopy. Eligible trials had to report categorical data on preparation quality and adherence, and report doses and frequency of administration of both treatments.

The review assessed bowel preparation quality and the proportion of patients completing the preparation. Preparation quality was classified as excellent (small volume of clear fluid or over 95% of surface seen), good (large volume of clear liquid covering 5 to 25% of surface), fair (some semi-solid stool that could be suctioned or washed away, but over 90% of surface seen), and poor (semi-solid stool that could not be suctioned or washed away and less than 90% of surface seen).

Included trials used different times for starting bowel preparation that ranged from 48 to 12 hours before the colonoscopy. Included trials gave different dietary advice that ranged from a regular diet to clear liquid diet for lunch and in the evening. Comparable scales to assess the quality of bowel preparation were used in included trials (details were reported). The mean age of included patients ranged from 48 to 84 years. Trials generally excluded patients with other comorbid conditions (where stated).

Two reviewers independently selected studies and resolved disagreements on inclusions by discussion.

Assessment of study quality
Study quality was assessed using investigator blinding.

The authors did not state how many reviewers assessed validity.

Data extraction
Numbers of patients with each outcome of interest were extracted and used to calculate odds ratios (ORs).

Data were extracted by one reviewer and a random selection was checked by a second reviewer. Discrepancies were resolved by discussion.

Methods of synthesis
Pooled odds ratios and 95% confidence intervals (CIs) were calculated using a random-effects (DerSimonian and Laird) model. Heterogeneity was assessed using Woolf’s test.

The potential for publication bias was explored using a funnel plot.

**Results of the review**
Eighteen RCTs were included in the review (n=2,792 patients). Sample size ranged from 72 to 422 patients. The investigator was blinded in all trials.

In sodium phosphate groups, a higher proportion of patients were classified as having excellent or good quality bowel preparation compared with polyethylene glycol groups (82% versus 77%; OR 1.43, 95% CI 1.01 to 2.00). Significant heterogeneity was found (p=0.0003).

There were no significant differences between sodium phosphate and polyethylene glycol groups in the proportion of patients classified as having excellent (34% versus 27%), good (30% versus 30%), fair (17% versus 17%) or poor (4.7% versus 7.7%) bowel preparation. These analyses were based on 10 trials that defined preparation quality in the desired categories.

In sodium phosphate groups, a higher proportion of patients completed the bowel preparation compared to polyethylene glycol groups (3.9% versus 9.8% did not complete the preparation; OR 0.40, 95% CI 0.17 to 0.88; nine RCTs). Significant heterogeneity was found (p<0.0001).

Funnel plots showed no clear evidence of publication bias.

**Authors' conclusions**
Sodium phosphate solution was more likely to be completed by patients and to result in an excellent or good bowel preparation compared with polyethylene glycol in adults undergoing elective colonoscopy.

**CRD commentary**
The review question was clearly stated and inclusion criteria were appropriately defined. Several relevant sources were searched, but no attempts were made to minimise publication or language bias. The potential for publication bias was assessed and no clear evidence was found. It was not clear why the review excluded trials published before 1990; the exclusion of these trials may have influenced review findings. Methods were used to minimise reviewer errors and bias in the selection of studies, but the entire data extraction process was not performed in duplicate, so reviewer error and bias could not be excluded.

The trial quality assessment was limited to investigator blinding, so results from the included trials and any synthesis may not be reliable. Trials were pooled using meta-analysis. The finding of significant heterogeneity indicated that summary measures of treatment effect may not be reliable. Although potential reasons for heterogeneity were not explored, some potential causes were discussed.

The evidence presented appeared to support the authors’ conclusions, but inadequate assessment of trial quality and differences between trials mean that the reliability of the findings is unclear.

**Implications of the review for practice and research**
**Practice**: The authors stated that sodium phosphate should not be used in patients with a suspected diagnosis of inflammatory bowel disease, elderly patients or patients with pre-existing renal insufficiency. It should only be used with caution in patients on medications that affect fluid balance or renal function. Any patient taking sodium phosphate should be advised on adequate hydration prior to and while taking sodium phosphate treatments. It should be noted that sodium phosphate has been the subject of a Food and Drug Administration safety alert.

**Research**: The authors did not state any implications for research.
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