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## Echinacea in the prevention of induced rhinovirus colds: a meta-analysis

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### CRD summary

This review evaluated the evidence that inoculation with Echinacea reduces the incidence of experimentally induced colds following rhinovirus challenge. The authors concluded that Echinacea is an effective prophylaxis for such infections, although symptom severity is not reduced. Given the small number of participants and concerns with review methodology and reporting, the reliability of the conclusions is unclear.

### Authors' objectives

To assess the efficacy of Echinacea extracts in the prevention of symptomatic experimentally induced rhinovirus colds.

### Searching

MEDLINE, EMBASE, CAPplus, BIOSIS Previews, CAB Abstracts, AGRICOLA, TOXCENTER, SciSearch, NAHL and NAPRALERT were searched. The dates of the searches were not reported, but the search terms were. Only papers in English or German were sought.

### Study selection

#### Study designs of evaluations included in the review

The inclusion criteria for study design were not explicitly stated, but it appears that only studies which satisfied published criteria (the Quality of Reporting of Meta-analyses Criteria) were eligible for inclusion. All of the included studies were double-blind placebo-controlled randomised controlled trials (RCTs).

#### Specific interventions included in the review

Studies assessing Echinacea extracts for the prevention of experimentally induced common colds (rhinovirus) were eligible for inclusion. The included studies used Echinacea purpurea (*E. purpurea*) and Echinacea angustifolia (*E. angustifolia*) extracts; one study used three different preparations of *E. angustifolia*. The studies included in the review were all placebo controlled. The included studies administered therapy for 7 or 14 days before a virus challenge and continued administration for 5 or 7 days following the virus challenge. The doses used were 300 mg three times a day and 176 mg three times a day.

#### Participants included in the review

Studies of participants exposed to the experimental induction of common colds were eligible for inclusion.

#### Outcomes assessed in the review

Studies that reported the development of symptomatic common colds were eligible for inclusion. This was the primary review outcome. The secondary review outcome was the total cold symptom severity, score on a scale of 0 (absent) to 4 (very severe). Definitions used by the authors of the included studies were accepted.

#### 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 included studies were assessed for validity using the Jadad scale, which considers allocation concealment, randomisation, blinding and losses to follow-up. The authors did not state how the validity assessment was performed.

### Data extraction

The authors did not state how the data were extracted for the review, or how many reviewers performed the data

extraction.

Data on the primary and secondary outcomes were extracted. Where multiple treatment groups were used in individual studies, these were pooled and the combined data used for the placebo comparison. In each study, odds ratios (ORs) with 95% confidence intervals (CIs) were calculated for incidence of cold episodes and mean differences with 95% CIs for total symptom severity.

## Methods of synthesis

### How were the studies combined?

The studies were combined in fixed-effect meta-analyses for each outcome. A pooled OR was calculated for incidence of cold episodes and a weighted mean difference (WMD) for total symptom severity scores. A power calculation was used to determine the power of the present meta-analysis to detect the effect size found.

### How were differences between studies investigated?

Statistical heterogeneity between studies was assessed using the chi-squared test. A sensitivity analysis using a random-effects model was also carried out. Differences between the studies, with respect to the extract used and dosing schedules employed, were discussed in the text.

## Results of the review

Three RCTs with 390 patients were included in the review.

All of the included studies were considered high quality, with Jadad scores of 4 or 5.

The Echinacea groups had significantly fewer episodes of symptomatic colds than the placebo groups (pooled OR 1.55, 95% CI: 1.02, 2.36,  $p=0.043$ ).

There was no difference in the severity of cold symptoms, as measured by total symptom scores, between the placebo and the Echinacea groups (WMD -1.96, 95% CI: -4.83, 0.90,  $p>0.05$ ).

No statistical heterogeneity was found for either outcome.

## Authors' conclusions

Clinical inoculation with standardised extracts of Echinacea was effective in the prevention of symptoms of the common cold when compared with placebo.

## CRD commentary

The review question was clear, although inclusion criteria were not explicitly defined in terms of the participants, intervention, outcomes and study dosing. The authors searched a number of relevant databases but did not report searching for unpublished material; this may have led to the introduction of publication bias and, consequently, the overestimation of therapeutic effectiveness. In addition, the search was restricted to studies in English or German, which may have led to the introduction of language bias; this would have a similar impact to publication bias. The authors did not report using appropriate methods to minimise bias and error in the study selection, data extraction and validity assessment processes. An appropriate validity assessment was conducted and the results noted in the synthesis. The decision to employ meta-analysis was appropriate although, ideally, the results of the three groups given different Echinacea preparations in one study would have been presented individually before being combined. The authors' conclusions accurately reflect the results of the review. However, although the review contained three high-quality RCTs the total number of participants was small. Given this and concerns with review methodology and reporting, it is not possible to determine how reliable the conclusions of the review are.

## Implications of the review for practice and research

Practice: The authors did not state any implications for practice.

Research: The authors stated that further prospective, adequately powered clinical studies are required to confirm the findings of this review and to quantify the effect of prophylactic Echinacea treatment.

**Bibliographic details**

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