

What are the effects of vitamin C on the duration and severity of the common cold?

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Abstract

Introduction

The common cold causes great morbidity throughout the world and there are no effective therapeutic agents against it. There is a belief that consuming vitamin C during a cold episode would help reduce duration and severity of symptoms. However, there is controversy about this claim.

Methods

To answer this question we used Epistemonikos, the largest database of systematic reviews in health, which is maintained by screening multiple information sources, including MEDLINE, EMBASE, Cochrane, among others. We extracted data from the systematic reviews, reanalyzed data of primary studies, conducted a meta-analysis and generated a summary of findings table using the GRADE approach.

Results and conclusions

We identified four systematic reviews that included eight primary studies overall, of which seven were randomized trials. We concluded vitamin C has minimal or no impact on the duration of common cold or in the number of days at home or out of work.

Problem

The common cold is one of the most common diseases in the general population. The term 'common cold' does not refer to a specific condition, but to a group of symptoms such as nasal obstruction, sore throat, cough, lethargy and asthenia, with or without fever. These symptoms have multiple etiological agents such as rhinovirus, adenovirus, syncytial virus, among others. Despite the benign nature of this condition, it leads to substantial economic burden in terms of medical consultation, treatment, and work or school absenteeism¹.

Antibiotics have no role in the treatment of the common cold, even though they are widely prescribed and used. The development of a vaccine has been elusive since this condition is caused by multiple agents. Considering the prevalence of this disease, and the

associated morbidity and costs, any intervention that can shorten the symptomatic period would constitute an important public health advance.

At the population level, it is widely believed that consuming vitamin C helps alleviate symptoms of the common cold. However, there is controversy about the scientific support to this belief.

Key messages

- Vitamin C has little or no impact on the duration of the cold and on days at home or out of work.
- Despite the lack of relevant adverse effects, investing in this treatment is not justified.

About the body of evidence for this question

| | |
|---|---|
| <p>What is the evidence. See evidence matrix in Epistemonikos later</p> | <p>We found four systematic reviews²⁻⁵ that included eight primary studies⁶⁻¹³ of which, seven were randomized trials⁶⁻¹². This table and the summary in general are based on the latter, since the observational study did not increase the certainty of the existing evidence, or provide additional relevant information.</p> |
| <p>What types of patients were included*</p> | <p>Four trials included patients of both sexes^{7,8,11,12}, one only included women⁹ and two did not specify it^{6,10}.</p> <p>Six trials included adults^{6-9,11,12} and one did not specify it¹⁰.</p> <p>The trials were conducted in Canada^{6,7}, the United States^{5,9}, the United Kingdom^{8,10} and Australia¹¹.</p> |
| <p>What types of interventions were included*</p> | <p>All the trials evaluated vitamin C administered in different doses, starting the first day of cold.</p> <p>All the trials compared against placebo, and two of them also evaluated the effectiveness of vitamin C by comparing different doses: 4 or 8 grams⁷ and 1 or 3 grams¹².</p> <p>The dose and duration of the treatment varied in all the studies: 3 grams per day for 5 days⁶, 4 or 8 grams per day for one day⁷, 1 gram per day for 5 days⁸, 4 grams per day for 2.5 days^{9,11}, 3 grams per day for 2 days¹⁰ and 1 or 3 grams per day for 3 days¹².</p> |
| <p>What types of outcomes were measured</p> | <p>The measurement method for the duration of the cold was very heterogeneous among the included trials, so, in order to standardize the results, the systematic review that included more trials² decided to report the duration in the form of percentages (being placebo equivalent to a 100%). To facilitate interpretation, these percentages were converted into absolute numbers according to the average number of days of symptoms in the trials.</p> |

Methods

To answer the question, we used Epistemonikos, the largest database of systematic reviews in health, which is maintained by screening multiple information sources, including MEDLINE, EMBASE, Cochrane, among others, to identify systematic reviews and their included primary studies. We extracted data from the identified reviews and reanalyzed data from primary studies included in those reviews. With this information, we generated a structured summary denominated FRISBEE (Friendly Summary of Body of Evidence using Epistemonikos) using a pre-established format, which includes key messages, a summary of the body of evidence (presented as an evidence matrix in Epistemonikos), meta-analysis of the total of studies when it is possible, a summary of findings table following the GRADE approach and a table of other considerations for decision-making.

The severity was also measured heterogeneously in the different trials. The reviews pooled the results as days at home or out of work, or with a symptom score.

* The information about primary studies is extracted from the systematic reviews identified, unless otherwise specified.

Summary of Findings

The information on the effects of vitamin C for the common cold is based on seven randomized trials including 3249 patients⁶⁻¹².

All trials reported the duration of the cold (3249 patients) and three trials^{7,8,11} reported days at home or out of work (2569 patients).

The summary of findings is as follows:

- Vitamin C has little or no impact on the duration of the cold. The certainty of the evidence is high.
- Vitamin C has little or no impact on days at home or out of work. The certainty of the evidence is high.

| Vitamin C for the treatment of the common cold | | | | |
|--|---|----------------|--------------------------|-------------------------------|
| Patients | Common cold | | | |
| Intervention | Vitamin C at the onset of the cold | | | |
| Comparison | Placebo | | | |
| Outcome | Absolute effect* | | Relative effect (95% CI) | Certainty of evidence (GRADE) |
| | WITHOUT vitamin C | WITH vitamin C | | |
| Duration of the common cold | 5.8 days** | 5.63 days | -- | ⊕⊕⊕⊕ High |
| | MD: -0.17 days (3.6 hours) (Margin of error: -0.48 to 0.14) | | | |
| Days at home or out of work | 0.88 days*** | 0.80 days | -- | ⊕⊕⊕⊕ High |
| | MD: -0.08 days (-1.9 hours) (Margin of error: -0.18 to 0.09) | | | |
| Margin of error: 95% confidence interval (CI). RR: Risk ratio. MD: Mean difference. GRADE: Evidence grades of the GRADE Working Group (see later). | | | | |
| * The risks WITHOUT vitamin C are based on the risks of the control group in the studies. The risk WITH vitamin C (and its margin of error) is calculated from the relative effect (and its margin of error). ** Average of 5 out of 7 trials, from which the duration of the common cold could be extracted. This outcome is expressed in a continuous manner, showing the number of days (or hours). *** Average of the 3 trials from which the days at home or without work of the common cold were extracted. This outcome is expressed continuously, showing the number of days (or hours). | | | | |

Follow the link to access the interactive version of this table ([Interactive Summary of Findings – iSoF](#))

About the certainty of the evidence

(GRADE)*

⊕⊕⊕⊕

High: This research provides a very good indication of the likely effect. The likelihood that the effect will be substantially different† is low.

⊕⊕⊕○

Moderate: This research provides a good indication of the likely effect. The likelihood that the effect will be substantially different† is moderate.

⊕⊕○○

Low: This research provides some indication of the likely effect. However, the likelihood that it will be substantially different† is high.

⊕○○○

Very low: This research does not provide a reliable indication of the likely effect. The likelihood that the effect will be substantially different† is very high.

* This concept is also called 'quality of the evidence' or 'confidence in effect estimates'.

† Substantially different = a large enough difference that it might affect a decision

Other considerations for decision-making

To whom this evidence does and does not apply

The results of this summary are widely applicable to people with the common cold, regardless of gender or race. Even though the participants in the trials did not include children, pregnant women, groups with comorbidities or people subjected to high physical stress or extreme cold, there are no compelling clinical reasons for not applying the evidence to these groups.

All of the included trials were conducted in Anglo-Saxon countries with temperate climates, however, there are no clinical or pathophysiological reasons for not applying the results to different geographic locations or climates. Therefore, in the absence of direct evidence in these contexts, it is reasonable to extrapolate the results of this summary to any person with the common cold.

About the outcomes included in this summary

The outcomes selected are those considered critical for decision-making based on the opinion of the authors of this summary, and are in agreement with those presented by the main systematic reviews identified.

Balance between benefits and risks, and certainty of the evidence

None of the systematic reviews conducted a meta-analysis of the adverse effects. One of the systematic reviews² delved into the topic reporting that seven studies (not specified) recorded data from a total of 2,490 patients who had used ≥ 1 g/day of vitamin C compared to 2066 who took placebo. In total, 5.8% of patients who received vitamin C had adverse effects (not detailed) that could be attributed to the medication, compared to 6.0% of those who took placebo. No serious adverse effects were reported.

Even though it is an intervention with minimal adverse effects, it has no benefit, so the balance between benefits and risks is not favorable.

Resource considerations

Notwithstanding vitamin C is easy to acquire and relatively inexpensive, it has no benefits, so the balance between benefits and costs is not favorable.

What would patients and their doctors think about this intervention

Faced with the evidence presented in this summary, most patients and doctors should lean against using this intervention.

However, as the belief in the efficacy of vitamin C is deeply rooted in the general population, additional efforts are probably needed to get the message across.

Differences between this summary and other sources

The conclusions presented are consistent with the main systematic review² and are also in agreement with the guideline 'The Common Cold'¹.

Could this evidence change in the future

The probability that future studies change the conclusion of this summary is very low, since the certainty of the evidence is high.

We did not identify ongoing trials addressing this question in the International Clinical Trials Registry Platform of the World Health Organization or systematic reviews in progress in the PROSPERO registry.

How we conducted this summary

Using automated and collaborative means, we compiled all the relevant evidence for the question of interest and we present it as a matrix of evidence.

| | Karlowski TR 1975 | Anderson TW 1974 | Glazebrook AJ 1942 | Anderson TW 1975 | Elwood PC 1977 | COWAN DW 1950 | Tyrrell DA 1977 | Audera C 2001 |
|---------------------|----------------------|---------------------|-----------------------|---------------------|-------------------|------------------|--------------------|------------------|
| Hemilä H 2013 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Truswell S 1986 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Chalmers TC 1975 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Hemilä H 1999 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

An evidence matrix is a table that compares systematic reviews that answer the same question. Rows represent systematic reviews, and columns show primary studies. The boxes in green correspond to studies included in the respective revisions. The system automatically detects new systematic reviews including any of the primary studies in the matrix, which will be added if they actually answer the same question.

Follow the link to access the **interactive version**: [Vitamin C for the treatment of the common cold](#)

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Notes

The upper portion of the matrix of evidence will display a warning of “new evidence” if new systematic reviews are published after the publication of this summary. Even though the project considers the periodical update of these summaries, users are invited to comment in *Medwave* or to contact the authors through email if they find new evidence and the summary should be updated earlier.

After creating an account in Epistemonikos, users will be able to save the matrixes and to receive automated notifications any time new evidence potentially relevant for the question appears.

This article is part of the Epistemonikos Evidence Synthesis project. It is elaborated with a pre-established methodology, following rigorous methodological standards and internal peer review process. Each of these articles corresponds to a summary, denominated FRISBEE (Friendly Summary of Body of Evidence using Epistemonikos), whose main objective is to synthesize the body of evidence for a specific question, with a friendly format to clinical professionals. Its main resources are based on the evidence matrix of Epistemonikos and analysis of results using GRADE methodology. Further details of the methods for developing this FRISBEE are described here (<http://dx.doi.org/10.5867/medwave.2014.06.5997>)

Epistemonikos foundation is a non-for-profit organization aiming to bring information closer to health decision-makers with technology. Its main development is Epistemonikos database

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