

Does vitamin C prevent the common cold?

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Abstract

Introduction

The common cold is one of the most common diseases. It is generally believed that the consumption of vitamin C prevents its appearance, but the actual efficacy of this measure is controversial.

Methods

To answer this question we used Epistemionikos, 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 eight systematic reviews including 45 studies overall, of which 31 were randomized trials. We concluded the consumption of vitamin C does not prevent the incidence of common cold.

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, etc. Despite the benign nature of this disease, it leads to a substantive economic burden in terms of medical consultation, treatment, and work or school absenteeism¹.

On the other hand, effective alternatives to prevent this condition are not available, and the efforts to develop a vaccine have been fruitless.

Vitamin C is usually perceived as an effective, harmless and inexpensive therapeutic alternative. Its use began in the early 30s and in the 70s it became widespread when the Nobel Prize winner, Linus Pauling, concluded that the use of vitamin C could prevent and relieve the common cold¹. It is thought that vitamin C could improve the functioning of the immune system through various mechanisms²: phagocytes and lymphocytes concentrate vitamin C in levels up to 100 times higher than plasma, suggesting it has a

role in the immune system; vitamin C increases the response of T lymphocytes and interferon levels. However, although the effects on the immune system are well reported, it is not clear whether the intake of vitamin C for the prevention of the common cold translates into a clinically relevant benefit.

Key messages

- The consumption of vitamin C does not prevent the incidence of common cold.

About the body of evidence for this question

<p>What is the evidence. See evidence matrix in Epistemonikos later</p>	<p>We found eight systematic reviews²⁻⁹ that included 45 primary studies reported in 43 references¹⁰⁻⁵², of which 31 corresponded to randomized controlled trials reported on 30 references¹⁰⁻³⁹.</p> <p>Three trials^{14,33,38} and the subgroups of five trials^{10,23,30,32,37} were excluded from the analysis because they did not refer to our population of interest. We also excluded four trials^{13,15,35,39} that used low-dose vitamin C as a placebo.</p> <p>This table and the summary in general are based on the relevant randomized trials. We excluded observational studies because they did not increase the certainty of the existing evidence or provide additional relevant information.</p>
<p>What types of patients were included*</p>	<p>The trials evaluated adults and children. Eighteen trials^{10,12,17-37} included adults and four trials included children^{16,25,26,31}. One trial¹⁰ included participants between 14-64 years.</p> <p>In general, the trials did not report the season when they were conducted and did not provide a clear definition of common cold, which is based on combination of symptoms such as nasal discharge, sore throat, lethargy and discomfort, with or without fever.</p>
<p>What types of interventions were included*</p>	<p>All trials evaluated supplementation with oral doses higher than 0.08 g/day of vitamin C.</p> <p>Nine trials^{10,17,18,22,31,32,34,36,37} administered low dose of vitamin C, in a range of 0.08 to 0.6 g/day. Ten trials 1 g/day^{11,12,19,20,23,25,26,28,29,30}, four trials 2 g/day [16,21,24,38] and one trial 3 g/day²⁷.</p> <p>All trials compared against placebo.</p>
<p>What types of outcomes were measured</p>	<p>The different trials measured multiple outcomes such, which were pooled by the systematic reviews as follows: incidence, duration and severity of the cold, among others.</p> <p>The follow-up period ranged from 3 weeks to 36 weeks.</p>

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

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.

Summary of Findings

The information of the effects of vitamin C in the prevention of common cold is based on 18 randomized trials^{10,12,16,17,19-22,24-26,28-30,32,34,36,37}, which include 8472 patients in total. All trials measured the incidence of common cold during a specific time interval (8,472 patients).

The summary of findings is as follows:

- The consumption of vitamin C does not prevent the incidence of common cold. The certainty of the evidence is high.

Vitamin C to prevent the common cold				
Patients	Healthy patients, adults and children			
Intervention	Vitamin C in doses greater than 0.08 g/day			
Comparison	Placebo			
Outcome	Absolute effect*		Relative effect (95% CI)	Certainty of evidence (GRADE)
	WITHOUT vitamin C	WITH vitamin C		
	Difference: patients per 1000			
Incidence of common cold	487 per 1000	473 per 1000	RR 0.97 (0.92 to 1.01)	⊕⊕⊕⊕ High
	Difference: 15 patients less (Margin of error: 5 less to 39 more)			
Margin of error: 95% confidence interval (CI). RR: Risk ratio. GRADE: Evidence grades of the GRADE Working Group (see later). *The risk WITHOUT vitamin C is based on the risk in the control group of the trials. The risk WITH vitamin C (and its margin of error) is calculated from relative effect (and its margin of error).				

Following 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

These results apply to healthy population in general, both adult and children. Although the trials did not evaluate patients with specific comorbidities, in the absence of direct evidence, it is reasonable to extrapolate this evidence to these populations.

This evidence does not apply to high performance athletes or other people subjected to major physical stress, since they are considered a different population, in which the etiology of cold symptoms responds to other mechanisms, not related to viral contagion.

About the outcomes included in this summary

The outcome selected for the summary of findings table is the only one considered critical for decision-making according to the opinion of the authors of this summary, which agrees with the systematic reviews analyzed.

Balance between benefits and risks, and certainty of the evidence

Although it is an intervention that has none or minimal adverse effects, as there is no benefit, the balance between benefits and risks is not favorable.

Resource considerations

Vitamin C is relatively inexpensive but has no benefit, so the balance between benefits and costs is not favorable.

From a population perspective, the expenses incurred to prevent the common cold by consuming vitamin C are large.

What would patients and their doctors think about this intervention

Faced with the evidence presented in this summary, both clinicians and patients should lean against using vitamin C for the prevention of the common cold.

However, it might be difficult to make patients desist from such deep-rooted preconceived ideas, even considering the certainty of the evidence. Therefore, variability in the decision-making is to be expected.

It is key for physicians to be reassured by scientific evidence in order to persuade their

patients that this popular treatment offers no benefit.

Differences between this summary and other sources

The conclusions of this summary coincide with those of the systematic reviews identified.

These results agree with those reported in the American Family Physician guideline⁵³, which rely on the results of the Cochrane systematic review⁴ to back their conclusions.

Could this evidence change in the future?

It is unlikely that the appearance of new evidence could modify the conclusions of this summary, due to the high certainty of the existing evidence.

In addition, we did not identify ongoing randomized trials evaluating this question in the International Clinical Trials Registry Platform of the World Health Organization, or ongoing systematic reviews in PROSPERO database.

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.

	Ritzel, G 1961	Anderson TW 1972	Pitt HA 1979	Karlowski TR 1975	Charleston SS 1972	Ludvigsson J 1977	Glazebrook AJ 1942	Coulehan JL 1974	Elwood PC 1976	Sabiston, BH 1974
Hemilä H 2013										
Truswell S 1986										
Hemilä H 1999										
Chalmers TC 1975										

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: [Vitamina C for the prevention of 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

www.epistemonikos.org.

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