

# Vitamin C in the Prevention and Treatment of the Common Cold



**Abstract:** *During the winter months, absenteeism or decreased productivity at work or school can often be attributed to symptoms of the common cold. Many people seek over-the-counter (OTC) products for their symptoms, and some of the commonly purchased products are those with high-dose supplements of vitamin C (ascorbic acid). The common cold causes enormous morbidity worldwide, and it is important to know the effects of vitamin C for both preventive and therapeutic purposes to correctly recommend the proper OTC product for these symptoms. The purpose of this article is to review the current data on the relationship between vitamin C and immune function, specifically, the utility of vitamin C supplementation in the prevention and treatment of the common cold.*

**Keywords:** common cold; vitamin C; ascorbic acid; immunity

**D**uring the winter months, absenteeism or decreased productivity at work or school can often be attributed to symptoms of the common cold. Although self-limiting, many people seek over-the-counter (OTC) products for their cold symptoms. Commonly these products contain high-dose supplements of vitamin C (ascorbic acid).

Vitamin C is a potent water-soluble antioxidant that gives the immune system a boost through its increase in T-lymphocyte activity, phagocyte function, leukocyte mobility, and possible antibody and interferon production.<sup>1</sup> Its effects on the immune system may also be potentially explained through protection against oxidative stress generated during

persists today. Pauling's book led to a multitude of scientific studies assessing the immune-system benefits of vitamin C. The purpose of this article is to review the current data on the relationship between vitamin C and immune function, specifically the effect of vitamin C supplementation in the prevention and treatment of the common cold.

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infections.<sup>2</sup> Vitamin C is not produced endogenously in humans and is therefore an essential dietary component.<sup>3</sup> The Natural Medicines Comprehensive Database indicates that vitamin C is likely safe when used below doses of 2000 mg daily and can be consumed through dietary sources like fresh fruits and vegetables, especially citrus fruits.<sup>1</sup> Conflicting evidence exists on the benefit of additional vitamin C supplementation for the prevention and treatment of the common cold.<sup>1</sup> The publication of *Vitamin C and the Common Cold* by Linus Pauling in 1970 generated a large public interest in this topic, which still

## Meta-Analysis and Systematic Review Evidence

Meta-analyses have summarized the evidence from numerous trials conducted after the release of Pauling's book. A systematic review by Hemilä and Chalker<sup>2</sup> included 63 placebo-controlled trials, 4 of which were included in Pauling's original research, to help answer the question as to whether vitamin C reduces the incidence, duration, or severity of the common cold when used as daily supplementation or at the onset of cold

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symptoms. The review analyzed 29 trial comparisons on the preventive effects of regularly administered vitamin C. Regularly administered is defined as vitamin C administered daily during the study period regardless of presence of cold symptoms. The results from the analysis of these studies indicated that for the general population, vitamin C supplementation given at doses  $\geq 0.2$  g/day had no effect on the number of people who catch the common cold (relative risk = 0.97; 95% confidence interval = 0.94-1.00).<sup>2</sup> Interestingly, a subgroup analysis found that regular vitamin C supplementation in persons under high physical stress (marathon runners, skiers, and soldiers) decreased the incidence of the common cold by 50%.<sup>2</sup>

While regularly administered vitamin C did not seem to affect the incidence of the common cold in the general population, the review also analyzed 31 comparisons on the effect of regular vitamin C supplementation on symptom duration and severity of colds. The results indicated that regular vitamin C supplementation (at an average dose of 1-2 g/day) resulted in a significant reduction in the duration of common colds, an 8% reduction for adults and 14% reduction for children. The severity of cold symptoms was also reduced. However, a variety of measures were used to classify severity in the studies and it is thus difficult to further define this finding.

Last, the review included 7 studies that analyzed the therapeutic effect of vitamin C. Unlike the aforementioned studies where vitamin C was administered regularly and prophylactic to cold onset, the therapeutic effect of vitamin C was examined by analysis of studies in which vitamin C was given in response to onset of cold symptoms. The results indicated that therapeutic vitamin C supplementation had no consistent effect on cold duration or severity. The included studies lacked consistency in timing of supplementation initiation, duration of supplementation, and dosage that may warrant further study to determine whether these variables play a

significant role in the immune-function efficacy of vitamin C.

A closer look at the therapeutic trials suggests the greatest potential for benefit in symptom severity and duration occurs when vitamin C treatment is no less than 5 days and initiated within 24 hours of symptom onset.<sup>2</sup> All but one trial (included in the Hemilä and Chalker<sup>2</sup> meta-analysis) assessing the therapeutic effects of vitamin C in which supplementation was given for at least 5 days showed significant reduction in duration of cold symptoms.<sup>4,6</sup> Three studies support initiating vitamin C within 24 hours of cold symptom onset.<sup>7,9</sup> The first study by Anderson et al, found benefit from vitamin C when it was administered on the first day of illness but did not compare these results to vitamin C initiated at a later interval.<sup>7</sup> A second study by Regnier, found that vitamin C administered beyond the first or second day of illness is not effective in lessening symptoms or shortening cold duration.<sup>8</sup> The last study, by Asfora, found a significantly shortened cold duration compared to other medications (aspirin, etc) when vitamin C was initiated within 24 hours of symptom onset (3.6 days versus 6.9 days, respectively).<sup>9</sup> However, when vitamin C therapy was initiated outside of the first day of illness, no significant difference was found between groups.

Higher doses of vitamin C seem to confer greater benefits as well. A study by Anderson et al<sup>7</sup> found that the proportion of colds lasting 1 day only was significantly larger in the study arm consuming 8 g of vitamin C on the first day of illness (46%; 222 out of 483 subjects) compared with the study arm consuming 4 g on the first day of illness (39%; 164 out of 417 subjects;  $P = .046$ ).

## Discussion

Although there is a definite physiological effect from regular vitamin C supplementation on common cold duration and severity, the practical significance of these findings is not very convincing. It does not seem reasonable to ingest additional vitamin C outside of

dietary intake throughout the year if the only benefit is the potential for a slightly shortened cold duration and lessened symptoms. Though the data do not consistently support the use of therapeutic vitamin C, more often than not, vitamin C supplementation is used as added precaution when a person feels a cold coming on, and this is how many of the popular over-the-counter products are marketed.

The National Institutes of Health recommend daily intake of 90 mg of vitamin C for males and 75 mg for females with a focus on getting those amounts from dietary sources, namely, fruits and vegetables.<sup>3</sup> Citrus fruits are a great source of vitamin C. A medium orange has 70 mg of vitamin C, and a medium grapefruit has 78 mg of vitamin C. The National Institutes of Health suggests that consuming 5 varied servings of fruits and vegetables daily can provide more than 200 mg of vitamin C.<sup>3</sup> Supplementation may be needed for those specific patients with marginal vitamin C status such as the elderly and chronic smokers, but the majority of the population should focus on getting vitamin C from their diet.<sup>3</sup>

## Conclusion

While data do show a decreased severity and duration of colds when vitamin C is consumed at doses at or above 0.2 g/day, it is most reasonable for patients to obtain this from their diet, considering supplementation did not decrease the overall incidence of colds in the general population. Regular supplementation may have a place in special populations, specifically those under high physical stress and those with marginal vitamin C status.

Overall, while there is a wide variety of data available, there is a lack of consistency, and further study is necessary to provide clarity on the utility of vitamin C for therapeutic purposes. Given the low cost and relative safety of vitamin C supplementation, it is not unreasonable for patients experiencing cold symptoms to see for themselves if therapeutic vitamin C is beneficial, but

they should know that the data behind its use are largely inconsistent. It appears the greatest potential for benefit of vitamin C in treating the common cold occurs when supplementation is initiated within 24 hours of symptom onset at high doses (~8 g daily) and when therapy is continued for at least 5 days. <sup>AJLM</sup>

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