

[MY PROFILE](#) [ADVANCED SEARCH](#) [RSS](#)

Search PLoS Medicine...



[Home](#) [Browse Articles](#) [About](#) [For Readers](#) [For Authors and Reviewers](#)

[PLoS Journals](#) [PLoS.org](#)

[HOME](#) > [RESPONSES](#)

Responses

Responses To This Article

[Vitamin C for Preventing and Treating the Common Cold](#)

Douglas RM, Hemilä H *PLoS Medicine* Vol. 2, No. 6, e168 doi:10.1371/journal.pmed.0020168

- | [Mental instability, vitamin C and immunity to common colds](#)
Arunachalam Kumar (01 August 2005)
- | [Response to the two earlier comments](#)
Harri Hemila, Robert M Douglas (29 July 2005)
- | [Misleading information on the properties of vitamin C](#)
Steve Hickey, Dr Hilary Roberts (05 July 2005)
- | [Narrow scope of vitamin C review](#)
William Sardi (05 July 2005)

Mental instability, vitamin C and immunity to common colds

Arunachalam Kumar

Professor of Anatomy

Kasturba Medical College, Mangalore 575001, India

[E-mail](#)

Competing Interests: I declare that I have no competing interests

Submitted Date: August 01, 2005

Published: August 01, 2005

In some parts of India, many a distressed mother totes her infant to the outpatient pediatrics departments, with complaint that her child has not contracted the common cold for a few months. Complaint? Not contracting a cold, is a worrisome one, at least here. High levels of illiteracy, prevalent socio-economic conditions, and cultural anthropological mores have given much currency to the peculiar theory that implicates development of insanity in those exempt from attacks of the common cold virus. The belief is spread widely across the population, and has been around for a long time. While it is easy (and perhaps even justified) in dismissing offhand the presumed connection between mental stability and frequency of episodes of common cold, the fact remains that many, even among the highly educated and modern also attach much credence to this popular mystical hypothesis.

Over the decades I have delved, among others, into history of dietary habits, family history of mental status, intake levels of Vitamin C enriched, caste and community perceptions on disease and treatment, but yet unable to establish any link between the frequency of attacks of cold, to a later manifestation of mental derangements. The latter, I have tried to quantify, by looking for falls academic performances, or behavior changes among children, and again, failed to find any correlations.

I am still curious as to whether there is some, yet unknown link between Vitamin C intake level, common cold frequency and cerebration status. One highly educated indignant mother was quite put off by my pooh-poohing her worry: she countered by querying - Have you ever seen an insane patient with a common cold?

Noting my mystified expression, she continued - You couldnt have doctor, for insanity provides immunity against many viral afflictions, including that of the cold. So what is funny about my belief that the cold virus protects my child against mental health degeneration?

Coming to think of it, I have yet to see any mentally ill patient with a runny nose. I would be interested to know more about this incredible theory from others more experienced in the field and with better expertise on the subject. The article by Douglas RM & Hemila H (2005) does show there is some correlation of significance between immunity to common cold and status of physique and physical activity, the why would it too fanciful if one were to extend the inference as applicable to mental health and activity also?

Is there a connection between mental faculties and frequency of attacks of common cold in the general population, and the status of frequency of common colds in mental asylums and facilities? And what role does level of Vitamin C rich diet play in all this?

Response to the two earlier comments

Harri Hemila

MD, PhD

Department of Public Health, University of Helsinki, Helsinki, Finland

[E-mail](#)

Additional Authors: Robert M Douglas

Competing Interests: None

Submitted Date: July 28, 2005

Published: July 29, 2005

The two responses to our article by Hickey and Roberts, and by Sardi, make the same point, namely that a recent pharmacokinetic study reported that frequent oral intakes of vitamin C would be necessary to elevate plasma ascorbic acid levels to the point where they believe it would have a pharmacological impact. Both authors suggest that the conclusions of our Cochrane review are flawed because all of the placebo-controlled trials that have been carried out so far have used, for both prophylaxis and therapy, one to three times per day of vitamin C ranging from 200 mg daily to as much as 8 grams in a single daily dose.

We have not, as our critics imply, concluded that vitamin C in the doses used in trials reported in the literature has no effect on the common cold. On the contrary, our evidence indicated that in marathon runners and those exposed to high physical and/or cold stress, a substantial prophylactic effect was observed, and that in the general population using regular vitamin C prophylaxis, cold duration was consistently shortened, but the level of shortening was relatively trivial.

We do not consider the vitamin C and the common cold story closed. Nor are we persuaded by the arguments of these three critics that frequent large doses would necessarily result in substantially greater benefits than earlier trials have demonstrated.

We consider that it may be useful to distinguish between a) prophylactic supplementation of people who are in good health and b) therapeutic supplementation of people who have an infection. The kidneys reabsorb essentially all vitamin C when the dietary intake is below 60-100 mg/day and vitamin C level in leukocytes is saturated by approximately 100 mg/day [1], and in this respect we doubt that prophylactic supplementation of healthy people, using doses higher than those in the published trials, might be expected to benefit the general healthy population. On the other hand, there is evidence indicating that common cold infection decreases vitamin C level in leukocytes suggesting changes in vitamin C metabolism [2], and in this respect there seems to be rationale to study the effects of supplementation on people infected with the common cold using even higher doses.

To this point, the claim that these two letters make has not been reported in properly conducted randomized controlled trials of either therapy or prophylaxis. We look forward to incorporating such trials when they have been carried out, in future versions of the Cochrane review. Meanwhile we stand firmly by the conclusions reported in our article.

References

1. Levine M, Conry-Cantilena C, Wang Y, Welch RW, Washko PW, et al. (1996) Vitamin C pharmacokinetics in healthy volunteers: evidence for a recommended dietary allowance. *Proc Natl Acad Sci U S A* 93: 3704-3709.
2. Hume R, Weyers E (1973) Changes in leucocyte ascorbic acid during the common cold. *Scott Med J* 18: 3-7.

Misleading information on the properties of vitamin C

Steve Hickey

Dr

Manchester Metropolitan University

[E-mail](#)

Additional Authors: Dr Hilary Roberts

Competing Interests: We have no financial interest in the sale of vitamins or other supplements.

Submitted Date: July 04, 2005

Published: July 05, 2005

Douglas and Hemila's review[1] covers 60 years of research into vitamin C and the common cold. However, the review omits pharmacokinetic data which invalidates the conclusion that vitamin C is ineffective. This conclusion is not derivable from the data presented.

The dual-phase pharmacokinetics of vitamin C are described by the dynamic flow model.[2,3] Low intakes of ascorbate, leading to blood plasma levels below 70 microM/L, have a half-life of 8-40 days. Higher gram-level intakes have a plasma half-life of 30 minutes.[2] A large oral dose raises blood levels briefly, reaching a peak after 2-3 hours, before decaying back to baseline. Frequent repeated doses allow sustained high plasma levels of about 250 microM/L.[3,4]

Douglas and Hemila reviewed intakes that transiently raise plasma ascorbate above 70 microM/L. A single dose does not raise the median level.[5,6] Daily supplements would thus not increase disease resistance to any great degree.[2,3] Single or twice daily doses will not increase background plasma levels, regardless of the magnitude of the dose.[5,6] Since plasma ascorbate is at background level for the majority of the day, effects will be minimal.

There is widespread confusion of nutritional and pharmacological levels of supplementation.[2] Linus Pauling typically described nutritional gram-level doses to provide a degree of disease prevention.[7] By contrast, pharmacological doses used for treatment are, at minimum, an order of magnitude larger and involve frequent doses. The doses should be at intervals of three hours or less.[2] Treatment doses are described by Cathcart's paper on titration to bowel tolerance.[8] To treat the onset of a cold, the therapy is perhaps a minimum of 10 grams of oral ascorbic

acid, followed by at least two grams each hour.[2,3]

Douglas and Hemila give a misleading impression, by not making it clear that the doses they consider are not pharmacological. They claim that the results of one study, giving an 8 gram dose at the start of symptoms, are tantalising and deserve further assessment. However, once this single dose has been excreted, the protective effects will be lost. During illness, ascorbate is depleted rapidly and higher oral intakes are tolerated - up to 200g per day.[8] It would be surprising if this eight gram dose had a large effect.

Studies on ascorbate require appropriate doses. Douglas and Hemila have only confirmed that 60 years of vitamin C research has largely been wasted, because of confusion between nutritional and pharmacological intakes, and a misunderstanding of the pharmacokinetics. It is essential that high dose studies take into account ascorbate's dual-phase pharmacokinetics. The dosing regime should allow sustained, high plasma levels to be achieved. The claim that vitamin C cannot prevent or cure the common cold is both premature and unwarranted.

1. Douglas R.M. Hemila H. (2005) Vitamin C for Preventing and Treating the Common Cold, PLoS Med., 2(6), e168, Jun 28.
2. Hickey S. Roberts H.J. (2004) Ascorbate: The Science of Vitamin C, Lulu press.
3. Hickey S. Roberts H.J. Cathcart R.F (2005) Dynamic flow: a new model for ascorbate, J. Orthomolecular Med, in press.
4. Padayatty S.J. Sun H. Wang Y. et al (2004) Vitamin C Pharmacokinetics: Implications for Oral and Intravenous Use, Ann Intern Med, 140, 533-7.
5. Levine M, Conry-Cantilena C, Wang Y. et al (1996) Vitamin C pharmacokinetics in healthy volunteers: Evidence for a recommended dietary allowance, Proc. Natl. Acad. Sci. USA, 93, 3704-9.
6. Levine M. Wang Y. Padayatty S.J. et al (2001) A new recommended dietary allowance of vitamin C for healthy young women Proc. Natl. Acad. Sci. USA, 98 (17), 9842-6.
7. Pauling L. (1970) Vitamin C and the Common Cold, W. H. Freeman, New York.
8. Cathcart R.F. (1981) Vitamin C, titrating to bowel tolerance, anascorbia, and acute induced scurvy, Medical Hypotheses 7, 1359-76

Narrow scope of vitamin C review

William Sardi

Author

Knowledge of Health

[E-mail](#)

Competing Interests: Spokesperson for dietary supplement companies; author books on dietary supplements

Submitted Date: July 05, 2005

Published: July 05, 2005

Sixty years of flawed research, without a mention of it in a review paper, should negate any conclusion. There was no mention of the revealing paper published last year [1] which shows three times greater blood concentration can be achieved with oral dose vitamin C than previously thought possible. Since viruses increase the demand for ascorbic acid, the oral doses used in the reviewed studies appear trivial and would not be expected to produce any positive effect. Compare human oral dose studies to what animals synthesize throughout the day. It is obvious that a single dose of a water soluble vitamin, regardless of the number of milligrams consumed, will not elevate blood levels significantly to produce a preventive or therapeutic effect.

[1] Padayatty SJ, Sun H, Wang Y, et al, Vitamin C pharmacokinetics: implications for oral and intravenous use. Ann Intern Med. 2004 Apr 6;140(7):533-7.

All journal content, except where otherwise noted, is licensed under a [Creative Commons Attribution License](#).

[Privacy Statement](#) [Terms of Use](#) [Advertise](#) [Help](#) [Site Map](#) [PLoS.org](#)