

FAQ: What is the Role of Vitamin C in Treatment and Prevention of COVID-19?

Vitamin C (Ascorbic Acid) is an antioxidant that acts on the body's inflammatory cascade. Researchers have theorized that it may be useful for the treatment or prevention of common colds, respiratory viral illnesses, and sepsis; however, data supporting use for each of these conditions are limited.^{1, 2} In addition, large doses of vitamin C given chronically have been associated with unintended consequences, such as false negative stool guaiac results, diarrhea, abdominal bloating, oxalate kidney stones in males, and fatal cardiac arrhythmias in patients with iron overload.³⁻⁶ In 2017, a small, quasi-experimental, non-randomized single-center study was published evaluating high-dose IV vitamin C, IV hydrocortisone, and thiamine administered within the first 24 hours of ICU admission for sepsis. This regimen was associated with a decrease in patient mortality, duration of vasopressor use, and organ dysfunction.⁷ This study had many limitations, including a low number of patients (n=47 in pre and post-intervention groups), single-center design, imbalances between baseline characteristics in the groups, and lack of randomization.⁸ Subsequent multicenter, randomized controlled trials have failed to validate these findings. In these studies, IV vitamin C did not improve outcomes such as vasopressor-free survival time, degree of organ dysfunction, or reduction in inflammatory markers/signs of vascular injury.⁹⁻¹⁰ IV vitamin C was reportedly well-tolerated in these trials, and there is still ongoing research for its use in sepsis.

Many have wondered if IV vitamin C might have a role in prevention or treatment of COVID-19. At this time, the NIH COVID-19 guidelines do not currently endorse vitamin C for the prevention or treatment of COVID-19.¹¹ There currently several studies enrolling that are evaluating use of IV vitamin C in patients with COVID-19.¹²⁻¹⁷ An existing multicenter trial comparing high-dose IV vitamin C to placebo for sepsis patients in intensive care units expanded its eligibility to include COVID-19 patients and was one of the first clinical trials to begin evaluating this therapy. This blinded randomized trial will primarily assess 28- day mortality and persistent organ dysfunction.¹² Another Phase 2 clinical trial in China is enrolling participants to evaluate the role of vitamin C infusion for the treatment of severe pneumonia in COVID-19 patients. The primary study outcome is ventilation free days during the first 28 days after patients' enrollment. Secondary outcomes include: 28-day mortality, ICU length of stay, demand for first aid measures, vasopressor days, respiratory indexes, ventilator parameters, APACHE II scores, and SOFA scores.¹³ Two additional studies are evaluating oral ascorbic acid in outpatients with COVID-19.¹⁸⁻¹⁹

However, no studies have been published to date supporting the use of vitamin C for the treatment or prevention of COVID-19. Additionally, trials evaluating the role of vitamin C for the treatment and prevention of other viral illnesses and sepsis have limited and/or conflicting data. Hopefully, additional studies underway will help illuminate the role of vitamin C in COVID-19 patients.

References:

1. Yassen MA et. al. Intensive Care Med. DOI: 10.1007/s00134-020-05943-5.
2. Hemila H et. al. Cochrane Database 2013. <https://doi.org/10.1002/14651858.CD000980.pub4>.
3. Jaffe RM et. al. Ann Intern Med. DOI:10.7326/0003-4819-83-6-824.
4. Ferraro PM et. al. Am J Kidney Disease. DOI:10.1053/j.ajkd.2015.09.005.
5. Thomas LDK et. al. JAMA. doi:10.1001/jama.2013.2296.
6. Midaran CJ et. al. Aust N Z J Med. DOI: 10.1111/j.1445-5994.1982.tb02457.
7. Marik PE et. al. Chest 2017. DOI:10.1016/j.chest.2016.11.036.
8. Kalil AC et. al. JAMA. 2020; 323(5), 419-420.
9. Fowler AA et. al. JAMA. DOI: 10.1001/jama.2019.11825.
10. Fujii T et. al. JAMA. DOI:10.1001/jama.2019.22176.
11. Coronavirus Disease 2019 (COVID-19) Treatment Guidelines. NIH. Accessed 29 June 2020 at: <http://covid19treatmentguidelines.nih.gov/>
12. ClinicalTrials.gov ID: NCT03680274. <https://clinicaltrials.gov/ct2/show/NCT03680274>.
13. ClinicalTrials.gov ID: NCT04264533. <https://clinicaltrials.gov/ct2/show/NCT04264533>.
14. ClinicalTrials.gov ID: NCT04323514. <https://clinicaltrials.gov/ct2/show/NCT04323514>.
15. ClinicalTrials.gov ID: NCT04363216. <https://clinicaltrials.gov/ct2/show/NCT04363216>.
16. ClinicalTrials.gov ID: NCT04401150. <https://clinicaltrials.gov/ct2/show/NCT04401150>.
17. ClinicalTrials.gov ID: NCT04395768. <https://clinicaltrials.gov/ct2/show/NCT04395768>.
18. ClinicalTrials.gov ID: NCT04342728. <https://clinicaltrials.gov/ct2/show/NCT04342728>.
19. ClinicalTrials.gov ID: NCT04395768. <https://clinicaltrials.gov/ct2/show/NCT04395768>.

Updated 7/2/20