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Review

# Efficacy and safety of lopinavir/ritonavir in the treatment of COVID-19: A systematic review

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Received 26 Aug 2020, Accepted 05 Nov 2020, Accepted author version posted online: 13 Nov 2020

 https://doi.org/10.1080/14787210.2021.1848545 





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## Abstract

**Objectives**: To systematically review the clinical literature reporting the use of Lopinavir/ritonavir (LPV/r) for the treatment of patients with COVID-19 to assess the efficacy of LPV/r for the treatment of Cornonavirus disease 19 (COVID-19).

**Methods**: The authors systematically searched PubMed and MedRxiv databases for studies describing treatment of COVID-19 patients using LPV/r compared to other therapies. Articles were excluded if they were case reports, opinion editorials, preclinical studies, single-armed studies, not written in English, not relevant to the topic, or published before May 2020. The included outcomes were viral clearance as measured by reverse-transcription polymerase chain reaction (RT-PCR) negativity and/or improvement on chest computed tomography (CT), mortality, and adverse events (AEs).

**Results**: Among 858 total studies, 16 studies met the inclusion criteria and were included in the qualitative review. These studies consisted of 3 randomized control trials, 3 open-label trials, and 10 observational studies. Most of these studies did not report positive clinical outcomes with LPV/r treatment.

**Conclusion**: The systematic review revealed insufficient evidence of effectiveness and clinical benefit of LPV/r in the treatment of patients with COVID-19. Specifically, LPV/r does not appear to improve clinical outcome, mortality, time to RT-PCR negativity, or chest CT clearance in patients with COVID-19.

Keywords: coronavirus, SARS virus, severe acute respiratory syndrome, pneumonia, antiviral agents, lopinavir/ritonavir