

## COVID-19 and Influenza Co-infection: A Systematic Review and Meta-Analysis

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**Background and Aim:** Co-infection of COVID-19 with other respiratory pathogens which may complicate the diagnosis, treatment, and prognosis of COVID-19 emerge new concern. The overlap of COVID-19 and influenza, as two epidemics at the same time can occur in the cold months of the year. The aim of current study was to evaluate the rate of such co-infection as a systematic review and meta-analysis.

**Methods:** A systematic literature search was performed on September 28, 2019 for original research articles published in Medline, Web of Science, and Embase databases from December 2019 to September 2020 using relevant keywords. Patients of all ages with simultaneous COVID-19 and influenza were included. Statistical analysis was performed using STATA 14 software.

**Results:** Eleven prevalence studies with total of 3,070 patients with COVID-19, and 79 patients with concurrent COVID-19 and influenza were selected for final evaluation. The prevalence of influenza infection was 0.8% in patients with confirmed COVID-19. The frequency of influenza virus co-infection among patients with COVID-19 was 4.5% in Asia and 0.4% in the America. Four prevalence studies reported the sex of patients, which were 30 men and 31 women. Prevalence of co-infection with influenza in men and women with COVID-19 was 5.3 and 9.1%, respectively. Eight case reports and 7 case series with a total of 123 patients with COVID-19 were selected, 29 of them (16 men, 13 women) with mean age of 48 years had concurrent infection with influenza viruses A/B. Fever, cough, and shortness of breath were the most common clinical manifestations. Two of 29 patients died (6.9%), and 17 out of 29 patients recovered (58.6%). Oseltamivir and hydroxychloroquine were the most widely used drugs used for 41.4, and 31% of patients, respectively.

**Conclusion:** Although a low proportion of COVID-19 patients have influenza co-infection, however, the importance of such co-infection, especially in high-risk individuals and the elderly, cannot be ignored. We were unable to report the exact rate of simultaneous influenza in COVID-19 patients worldwide due to a lack of data from several countries. Obviously, more studies are needed to evaluate the exact effect of the COVID-19 and influenza co-infection in clinical outcomes.

**Keywords:** coronavirus, COVID-19, influenza virus, co-infection, meta-analysis, systematic review