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## LETTER TO THE EDITOR

### COVID-19 Cytokine Storm Complications in Asthmatic Patients

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#### Abstract:

The pandemic of coronavirus disease 2019 has inflicted millions of people in the world and caused severe complications in immunocompromised individuals. Some evidences suggest that severe COVID-19 complications are associated with the cytokine storm syndrome, contributing to the high mortality rate of the disease. Asthma is a complicated disease of the respiratory system. COVID-19 symptoms can be worse in asthmatic patients than others. Corticosteroids with anti-inflammatory functions which are used in asthmatic patients may have adverse outcomes in coronavirus infection and are not recommended for the treatment of COVID-19. Furthermore, asthmatic patients (using inhalation corticosteroids) have a suppressed immune system in the lung, which increases their susceptibility to COVID-19 infection.

**Keywords:** COVID-19, Asthma, Cytokine, Storm, Patient, Pandemy.

#### Article History

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## 1. INTRODUCTION

The pandemic of coronavirus disease 2019 (COVID-19), with a mortality of approximately 2 to 4.4%, has inflicted millions of people in more than 200 countries across the globe [1].

Coronavirus comprises an enclosed RNA and is one of the major pathogens that primarily target the human respiratory system. Overall, COVID-19, like MERS (Middle East respiratory syndrome), causes severe complications in immunocompromised individuals. The immunopathogenesis of COVID-19 is different from that of SARS (Severe Acute Respiratory Syndrome) and MERS. The main complication of COVID-19 is severe pneumonia. Some evidences suggest that severe COVID-19 complications are associated with the cytokine storm syndrome, which along with Acute Respiratory Distress Syndrome (ARDS), contribute to the high mortality rate of the disease. Significantly high levels of cytokines and chemokines including IL-1 $\beta$ , IL-1RA, IL-2, IL-7, IL-8, IL-9, IL-10, FGF2, G-CSF, GM-CSF, IFN- $\gamma$ , IP10, MCP1, MIP1 $\alpha$  and  $\beta$ , PDGFB, TNF- $\alpha$ , CCL3, CCL5, CCL2, CXCL10 and VEGFA have been noted in COVID-19 patients. Explaining the immunopathology of the cytokine storm syndrome, apoptosis of epithelial and endothelial cells leads to vascular leakage and inflammatory cells infiltration, resulting in hypoxia and ARDS. ARDS is a primary cause of death in

COVID-19 patients. In these patients, corticosteroids may exacerbate lung injury. However, in cases with hyper-inflammation, corticosteroids are likely to be beneficial through inducing immunosuppression and modulating inflammatory pathways. Patients with severe COVID-19 pneumonia should be evaluated for hyper-inflammation. As immunosuppression may lower the mortality of COVID-19, the administration of intravenous immunoglobulin and cytokine blockers can be effective for treating the patients [2 - 5].

Asthma is a complicated disease of the respiratory system. Bronchial inflammation is the most prominent pathological feature in asthma [6]. Therefore, COVID-19 symptoms can be worse in asthmatic patients than others because of already existing breathing problems in these patients. Inhalation of corticosteroids, as it promotes anti-inflammatory effects, is the mainstay of asthma treatment. Inhaled and systemic corticosteroids are also used to treat acute asthma and prevent its exacerbation. Corticosteroids with anti-inflammatory functions which are used in asthmatic patients may have adverse outcomes in coronavirus infection and are not recommended for the treatment of COVID-19.

## CONCLUSION

Thus, asthmatic patients who use corticosteroids and have vulnerable airways may suffer from complex sequela in the case of concomitant COVID-19 infection. Indeed, the cytokine storm syndrome of the coronavirus infection could be unimaginably dangerous for these patients. Furthermore,

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asthmatic patients have a suppressed immune system in the lung, which increases their susceptibility to COVID-19 infection.

### CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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