



Impact of Respiratory Co morbidities in Corona virus – A review

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Abstract

As novel coronavirus disease-2019, commonly named as COVID 19 caused by severe respiratory syndrome with higher mortality rate. The COVID 19 symptoms are usually cough, fever, fatigue, sore throat, breathlessness and others. SARS-CoV-2 infection is accompanied by a variety of co morbidities and symptoms. For this research review, we searched 63 studies from high index journal that include key word like Chronic obstructive pulmonary disease, Asthma, Lung Cancer, Diabetes Mellitus, Bronchiectasis, Hypertension, Pneumothorax. According to inclusion criteria patients should be COVID 19 and pre diagnosed with respiratory conditions or co morbidities. By reviewing those studies COPD, Lung Cancer, and Diabetes Mellitus were the key co morbidities, which have the higher impact on COVID 19 diseases. Other co morbidities include Asthma, Bronchiectasis, Hypertension, and Pneumothorax having the lowest impact on COVID 19 diseases. So present study aimed to see the impact of respiratory co morbidities on COVID 19.

Keywords: COPD, Diabetes Mellitus, Lung Cancer, Covid 19

INTRODUCTION

A coronavirus (CoV) named 'COVID-19' by the World Health Organization (WHO) is in charge of the current outbreak of pneumonia that began at the beginning of December 2019. COVID-19 is a pathogenic virus¹. All over, 6.9 million people are already affected by coronavirus disease². This virus cause serious disease in people of all ages. Patients over 60, as well as those with underlying medical co morbidities (obesity, cardiovascular disease, chronic kidney disease, diabetes, chronic lung disease, alcohol, stroke, solid organ or hematopoietic stem cell transplant patients), comprise the majority of symptomatic patients³. Covid 19 symptomatic patients present with fever, cough, and shortness of breath and less with a sore throat, anosmia, dysgeusia, anorexia, nausea, malaise, myalgias, and diarrhea⁴.

Due to their decreased underlying lung reserve and increased expression of the angiotensin-converting enzyme 2 (ACE-2) receptor in the small airways, patients with chronic respiratory disorders, especially chronic obstructive pulmonary disease (COPD), are at high risk for COVID-19 infection. However, comprehensive analyses of the risks, disease severity, and clinical course in COVID-19 patients with COPD are lacking⁵. Disease Control and Prevention suggests that over one third of adult patients who were hospitalized with COVID-19 were respiratory related such as COPD⁶.

Bronchogenic carcinoma is another name for lung cancer. As smoking is the most prevalent cause of lung cancer, it is one of the main causes of cancer-related fatalities⁷. Numerous studies have found that cancer

patients, particularly those with lung cancer, had poorer results from coronavirus disease 2019 (COVID-19), including increased hospitalization and mortality rates⁸. The most prevalent cancer type in that group was lung cancer (25 percent), with one patient getting immunotherapy. Patients with lung cancer were more likely to acquire dyspnea earlier, develop anoxia, and have a faster development of COVID-19 symptoms. While recent cancer treatment appears to be a risk factor for significant COVID-19 infection complications⁹.

Asthma is a chronic inflammatory illness of the airways characterized by airway hyperresponsiveness, which causes wheezing, dyspnea, chest tightness, and/or coughing¹⁰. SARS-CoV-2 infection is uncommon among asthma patients, while it is more common than in the overall population. The increased risk of hospitalization in individuals with asthma owing to COVID-19 is predominantly correlated with age and related co morbidities; death was mostly a problem for the elderly¹¹.

Bronchiectasis is a chronic respiratory condition marked by a persistent cough and recurrent respiratory infections caused by persistent bronchial dilation¹². COVID-19 individuals who had bronchiectasis had more severe clinical symptoms and had worse outcomes than those who did not have bronchiectasis¹³.

Diabetes mellitus is a group of metabolic diseases characterized by chronic hyperglycemia resulting from defects in insulin secretion, insulin action, or both¹⁴. One of the report on COVID 19 patients revealed that diabetes patients were at higher risk for need of intensive care unit, which usually means invasive ventilation. In this report 22.2% of ICU patients had diabetes compared to 10.1% in the overall hospitalized COVID 19 population¹⁵. As compared to patients without diabetes, patients with poorly managed glycemia have a four-fold higher mortality risk and a four-fold longer hospital stay¹⁶.

The most prevalent co morbidity among COVID 19 patients is hypertension, which is associated with a greater risk of infection as well as worse outcomes and prognosis¹⁷. Patients with these 154 co-morbidities were presumably treated with ACE2 medications, which may have impacted the presence of 155 of these receptors, boosting SARS-CoV-2 receptor use. Other research has found that elevated ACE2 expression in

individuals with hypertension, diabetes, and 157 cardiovascular disorders may make it easier for SARS-CoV-2 to penetrate the targeted cells in the 158 respiratory system, extending the time it takes for the virus to clear¹⁸.

The present study therefore aimed to see the impact of respiratory co morbidity along with respiratory carcinoma, diabetes, and hypertension conditions impact on COVID 19 infected cases.

METHODS:

The study observed different journals index in Scopus, pub med, cross ref on key words respiratory co morbidities and covid 19. We found more than 100 article that were further scanned for our study title that included key word like COPD, Asthma, Diabetes Mellitus, Bronchiectasis, Pneumothorax, and Hypertension. Inclusion criterion was that articles including patients diagnosed with covid 19 should be pre diagnosed of respiratory condition or co morbidity. Articles were excluded if it was not from an index journal and having low impact factor. Articles were sided if they explain co morbidity other than respiratory condition. All the 48 articles matching closely the inclusion and exclusion criteria were then selected for discussion. Discussion was specifically framed for COPD, asthma, bronchiectasis, pneumothorax, diabetes mellitus, and hypertension etc.

DISCUSSION:

COPD is related with COVID 19. The present study reviewed 15 studies on COPD that were from the high impact indexed journal in Scopus, pub med etc. The present studies have seen that patient having COPD had more severe complication in COVID 19 cases. Patients with COPD, as well as current smokers, are consistently reported to have worse outcomes after COVID-19 infection. Smokers and COPD without other co morbidities present a higher risk for severe COVID 19^{19,20,21}. The incidence of COPD in COVID-19 patients was low, but the risk of severe complications (63%) and mortality (60%) was significant, indicating that COPD patients with confirmed COVID-19 are at a higher risk of severe complications and death. COPD patients with COVID 19 had a death rate that was around two times higher than those without COPD. COPD is associated with increased risk for severe COVID 19 diseases by 5

times in current smokers that may be due to as patients with COPD or Chronic smoking had higher ACE2 gene expression levels^{22,5,23}. Another study indicated that pre-existing COPD is a significant risk factor for hospitalization, higher ICU admission and needs greater requirements for mechanical ventilation and also showed higher mortality and high risk of progression to poor outcomes^{24, 25,26,27,28}. Based on above study this study also indicates that COPD patients have a slightly higher risk of developing severe outcomes of COVID-19 compared with patients without obstructive lung disease²⁹. A study found that males are at increased risk for mortality in COVID-19 disease compared with females³⁰. One research found that COPD patients are at increased risk for SARS-CoV-2 infection, with infection rates doubling in the general population over the age of 40, and an incidence of COVID-19 in COPD³¹. Respiratory disorders are a strong predictor of severe COVID-19 outcomes, according to a study on the incidence of underlying respiratory disorders³².

Similarly, lung cancer is associated with COVID-19. We searched on high impact indexed journal in Scopus, pub med, Google scholars etc and reviewed 8 studies on lung cancer. Some of the study related to lung cancer state that COVID-19 is more severe and having higher mortality rate in patients with lung cancer and with other malignancies. Lung cancer patients also had a higher severity of disease, as well as higher rates of ICU hospitalization and mechanical ventilation. According to the study COVID-19 caused mortality in around a quarter of lung cancer patients who had more COVID-19 related anxiety than predicted, and COVID-19 accounted for a small percentage of lung cancer death^{8,33,34,35}. The study's aim was to see how COVID-19 affected lung cancer screening and subsequent cancer detection. Patients with lung cancer are more vulnerable due to existing comorbidities such as smoking and pulmonary illness. According to reports, COVID-19-affected cancer patients had a 13 percent fatality rate³⁶. Another study showed that pre-diagnosed lung cancer was associated with higher morbidity and mortality in COVID-19 patients than the general population. The SARS-CoV-2 pandemic has affected patients with lung cancer and impaired the progress of lung cancer research^{37, 38}. Patients with lung cancer who have low baseline lung function and endurance are more likely to develop severe hypoxia and advance more quickly

with COVID-19 infection, underlining a critical need to treat COVID-19-infected cancer patients who have worsening conditions and poor outcomes³⁹.

Diabetic individuals are more likely to have a severe COVID-19 clinical course. The current study evaluated at ten diabetes studies that were found in high-indexed journals like Google scholars and Pub med. Hospitalized COVID-19 patients with newly diagnosed diabetes and known diabetes show higher increased risk of mortality than compared to diabetes and normal glucose. Patients with diabetes showed high prevalence, severity of disease and mortality during SARS-CoV-2 infection as well as higher rates of ICU admission, also obesity and diabetes is an important risk factor for the progression, mortality or morbidity and required attention and adequate care in COVID-19. Higher severe infection and case-fatality rates compared with non-diabetic patients especially those with poorly-controlled HbA1c and also C-reactive protein may help to identify diabetic patients who are at greater risk of dying in hospitalization^{40, 41,42,43,44,45,46}. COVID-19 individuals with a history of hypertension, obesity, chronic lung disease, or diabetes had the poorest prognosis, with the majority of them developing ARDS or pneumonia⁴⁷. According to research, SARS-CoV-2 pneumonia patients with diabetes have a worse prognosis than those without diabetes, and diabetes may be a risk factor for CoV-19^{48, 49}.

Study carried out on bronchiectasis indicates that patients with bronchiectasis may be more prone to COVID-19 infection than those without bronchiectasis. Additionally, COVID-19 patients with bronchiectasis showed more severe clinical manifestations and poorer outcomes than those without bronchiectasis⁵⁰.

Asthma is not significantly associated with COVID-19. As per the present study we reviewed 11 studies on asthma that were taken from the high impact journal pub med, Google scholars etc. Natalia f. Mendes study on 372 articles describing the underlying diseases of 161,271 patients diagnosed with COVID-19⁵¹. Asthma is not as important as a pre-morbid condition, not associated with higher COVID-19 severity or worse prognosis / asthma exacerbation and patients with asthma have lower risk of death and could be protective against the disease and no increase in need for intubation/mechanical ventilation and lower

hospitalization risk in patients with asthma^{52,53,54,55}. Study done by José Luis Izquierdo indicate that, frequency of SARS-CoV-2 infection has been low in patients with asthma and increased risk for hospitalization due to related co morbidities⁵⁶. According to one study, asthma is not a risk factor for a worse COVID-19 outcome. If the patients had had an acute aggravation of COVID-19 infection in the previous year, the mortality rate might be greater⁵⁷. The Paul D. Terry research found no indication of a link between asthma and an increased risk of COVID-19 diagnosis, hospitalization, severity, or death⁵⁸. Asthma is a possible risk factor for COVID19 infection in children, but not for severity or fatality, according to this research. The impact of the COVID-19 pandemic on pediatric asthma services and illness burden in its patients is described in this study. COVID-19 does not appear to affect asthmatic children disproportionately^{59, 60}. According to Jamie Hartmann-Boyce, there is no evidence for COVID-19, and asthma research is limited and evolving. More investigation on the probable links between asthma and diabetes is required. After controlling for confounding variables, this study concludes that there is no indication of a link between asthma, asthma medication, or asthma severity and COVID-19 clinical outcomes⁶¹.

The mechanical ventilation appears to be predominant risk factor for development of pneumothorax with COVID-19 pneumonia and spontaneous pneumothorax is a rare complication of COVID-19 viral pneumonia⁶².

Hypertension is associated with the COVID 19. We searched 5 studies from the high impact journal Google scholars. Those with hypertension who developed Covid-19 had a greater risk of ICU admission and mortality than patients without co morbidities. Hypertension raises the likelihood of severe COVID-19 infection by a small proportion, resulting in greater death and severity rates^{63, 64}. The association between hypertension and severe COVID-19 might be described by a cytokine imbalance. There isn't enough evidence to suggest that those with high blood pressure are more likely to contract COVID-19 than those who don't^{65, 66}. The most prevalent underlying disease among COVID-19 patients is hypertension, which has been related to an increase in the severity of COVID-19 infection. Age > 60 years, BMI > 25 kg/m², CVD, diabetes, and chronic renal

disease are all indicators of poor outcomes in individuals with COVID-19 infection¹⁷.

Conclusion:

In the present study there was significant impact seen on COVID 19 patients pre-diagnosed of COPD, Diabetes Mellitus, and Lung Cancer. Though these Asthma, Bronchiectasis, Pneumothorax, and Hypertension co morbidity also showing impact on COVID 19 patients it was less significant as in comparison to above respiratory co morbidity. However, more literature review and researched study are needed to replicate the data so that pre planed therapeutic intervention can be studied and adopted into general practice in COVID 19 patients for better prognosis.

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