Obesity as A Risk Factor For Severe COVID-19 Disease

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ABSTRACT

Objective: To explore the risk factors for severe COVID-19 disease.

Study Design: Case series.

Place and Duration of Study: Cavan General Hospital, Ireland, from Mar to May, 2020.

Methodology: All the admitted patients with laboratory confirmed COVID-19 infection were included in the study. Patients on non-invasive ventilation, in the Intensive Care Unit and on mechanical ventilation within the first 10 days of hospital admission were included in the study. The demographics, clinical details, radiological and laboratory findings were collected from the medical records.

Results: A total of 17 patients who required non-invasive ventilation/continuous positive airway pressure were included in the study. All patients were obese/overweight. Five patients required Intensive Care Unit admission and were subsequently intubated for mechanical ventilation. One patient died in ICU.

Conclusions: Obesity is a significant risk factor for severe COVID-19 disease, recognition of high-risk population could help clinicians identify patients with severe disease at an early stage.

Keywords: COVID-19, Hypertension, Obesity.

INTRODUCTION

COVID-19 was declared a pandemic in Mar 2020. The clinical presentation ranges from asymptomatic disease, mild upper respiratory tract infection viral pneumonia, respiratory failure or even death.[1] About 80% of the patients have mild or moderate disease, 14% get severe disease and 5% patients get critical disease.[2] Adults with advanced age or underlying medical comorbidities predominantly have severe illness, although serious illness can occur in otherwise healthy individuals of any age group.[3] Male gender and co-morbid conditions like hypertension, obesity and diabetes are risk factors for serious illness.[4]

Asymptomatic patients and those with mild to moderate disease are treated at home and the management is focused on the prevention of transmission to others and monitoring for clinical deterioration. Patients with severe dyspnea, oxygen saturation of <90%, altered mentation or other signs and symptoms of hypoperfusion or hypoxia are advised to attend emergency department for admission. All the in-patients require a set of investigations including a chest x-ray, routine blood investigations including C-Reactive Protein (CRP), D dimers, ferritin, troponin, Lactate Dehydrogenase (LDH) and echocardiography (ECG). These investigations help in knowing the prognosis and severity of the disease.[5]

Patients with severe disease often need oxygen support. High-flow oxygen cannula and non-invasive positive-pressure ventilation are being used, but the safety of these measures is uncertain as the disease is novel and the studies are limited and they are being considered aerosol-generating procedures. The World Health Organization (WHO) suggests titrating oxygen to a target peripheral oxygen saturation (SpO_2) of ≥90 percent. Initially nasal cannula up to 6L/min oxygen can be used, higher flows of oxygen may be administered using a simple facemask, venturi facemask, or non-rebreather mask (e.g. up to 10-20 L/minute).[6]

There is limited data on using high flow oxygen vs Non Invasive Ventilation (NIV) in patients requiring higher oxygen demand. For patients presenting with type-1 respiratory failure, Continuous Positive Airway Pressure (CPAP) is advised with initial Petting of 8 Positive End Expiratory Pressure (PEEP) with up titration to 20 until the required saturation is achieved. Patients retaining CO_2 or hypercapnia with underlying Chronic Obstructive Pulmonory Disease (COPD) are treated with Bilevel Positive Airway Pressure (BiPAP). The aim is to keep the saturation above 92% and R/R <22. The guidelines vary nationally as well as internationally as there is limited literature and vary from case to case. For patients with escalating oxygen requi-

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rements or clinical deterioration early intubation is preferred by many clinicians. This study was carried out to explore the risk factors for severe COVID-19 disease.

METHODOLOGY

It was a case series of 17 patients carried out at Cavan General Hospital, Ireland, from March to May 2020. This study was approved by the Institutional Review Board of the institution. Informed consent was taken from all the patients.

Inclusion Criteria: All the patients with age >17 years and laboratory confirmed COVID-19 infection were included in the study.

Exclusion Criteria: Patients with communication barrier were excluded. Patients with debilitating illness or pregnant ladies were also excluded from the study.

Demographic data, clinical details, radiologic findings and laboratory data were collected from medical records and the patients were followed throughout the clinical course requiring NIV, intensive care and mechanical ventilation. Thirteen patients required NIV, five were admitted to ICU and were mechanically ventilated. The primary end was to analyze if risk factors like, advanced age, race, gender, obesity, diabetes, hypertension, chronic heart disease, and chronic lung disease were associated with severe disease and need non-invasive ventilation, ICU-admission or mechanical ventilation within the first 10 days of hospital admission with COVID-19. Date were analysed by using SPSS version 22.

RESULTS

A total of 17 patients required NIV, out of which 5 patients required ICU admission and were subsequently intubated for mechanical ventilation. The mean age was 68 ± 2.5 years. The male to female ratio was 58-42%. One patient died in ICU and the remaining four were successfully extubated. All the patients were obese or overweight. A total of 52% patients with age >60 years required ICU admission. The other significant comorbid was hypertension (47%).

Table: Obesity and severe COVID-19 disease (n=17).

Parameters	Total n (%)	Non Invasive Ventilation n (%)	Intensive Care Unit Admission n (%)
Age (Years)			
40-50	3 (17%)	3 (17%)	-
51-60	4 (23%)	4 (23%)	1 (5%)
>60	10 (58%)	9 (52%)	4 (23%)
Gender (M=58%, F=42%)			
BMI (25-30)	10 (58%)	8 (47%)	2 (11%)
BMI >30	7 (42%)	4 (23%)	3 (17%)
Hypertension	8 (47%)		

DISCUSSION

The risk factors for severe COVID disease include, advanced age, male gender, obesity and hypertension.[4] Our study also had similar findings, all of the patients requiring respiratory support were obese or overweight. The other significant co-morbid was hypertension which was also supported by previous studies.[4] In the past obesity was an under recognized risk factor for hospital admission and need for critical care. In United States, nearly 40% of adults are obese with the Body Mass Index (BMI) >30 and it could have important clinical implications.[5] A French study showed the risk for invasive mechanical ventilation in the patients with COVID-19 infection admitted to ICU, was seven-fold higher for those with body mass index (BMI)>35 as compared to those with BMI <25.[6]

The mechanism is not clearly known that how obesity contributes to this. One study suggests that obesity or excess ectopic fat deposition may be a unifying risk factor for severe COVID-19 infection. It reduces protective cardiorespiratory reserves, potentiating the immune dysregulation and leading to the critical illness and organ failure in COVID-19 patients.[7] It is also recognized as an important risk factor for severe disease in other viral infections.[8] During the 2009 H1N1 pandemic, obesity was recognized as an independent risk factor for complications from influenza.[8]

Until now, there is very limited literature available and more studies are needed for the further explanation of the link between obesity, hypertension and severe COVID disease. Recognition of high-risk population is important for the prevention strategies, potential therapies and reducing the impact of this pandemic.

CONCLUSION

Obesity is a significant risk factor for severe COVID-19 disease, recognition of high-risk population could help clinicians identify patients with severe disease at an early stage.

Conflict of Interest: None.

Authors' Contribution

MMS: Principal investigator, conceptualisation & manuscript writing, AN: Data concept & data collection, SY: Data analysis, MWAR: substantial contribution in Manuscript writing.

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