PLASMA CRP LEVEL AND ITS ASSOCIATION WITH OUTCOME IN PATIENTS WITH SEVERE COVID-19 PNEUMONIA

Pushpa Raj Dhakal,[1] Niraj Kumar Jaiswal,[1] Manish Dahal,[1] Manoj Karki[1]

ABSTRACT

INTRODUCTION

Corona virus disease 2019 (COVID-19) has become a global public health issue with unpredictable progression to ARDS. Therapy timing of anti-inflammatory agents and immune-suppressing medication is of utmost importance. Previous studies have consistently found elevated levels of C-Reactive Protein with disease severity. In this study, we aimed to investigate the relationship between C-Reactive Protein and severe SARS-COV-2 pneumonia.

MATERIAL AND METHODS

Our study included 55 patients with COVID-19, admitted in COVID Unit of Universal College of Medical Sciences Teaching Hospital (UCMS-TH), Bhairahawa, Rupandehi, Nepal from 16 June 2021 to 15 September 2021. We included COVID-19 cases confirmed by a RT-PCR test with severe pneumonia based on WHO criteria and those undergoing C-reactive protein levels.

RESULTS

Males (56%) were more compared to females (44%). Age group 41-60 years were likely to develop severe COVID-19 pneumonia. Cough (44%), dyspnea (42%) and fever (40%) were most common symptom. Hypertension (34%) and diabetis (24%) were common comorbidities present. Patients with severe COVID-19 pneumonia had average CRP value of 59.6 mg/l.

CONCLUSION
Elevated CRP level was associated with COVID-19 severity.

KEY WORDS

COVID -19 ,CRP, SARS-COV-2 Pneumonia.

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INTRODUCTION

The new infectious coronavirus disease called COVID-19, began to spread from China in December 2019.[1] The first cluster to show these symptoms were patients from Wuhan, People's Republic of China (WMHC).[2] In early January 2020, scientists at the National Institute of Viral Disease Control and Prevention (IVDC) isolated the new virus for the first time from patients in Wuhan and found it to be a novel β-genus coronavirus, which has been named SARS-CoV-2.[3] COVID-19 (SARS CoV-2) spread rapidly via person to person contact and infect more commonly the pulmonary system.[4]

Progression to acute respiratory distress syndrome (ARDS) is not predictable as the disease activity and intensity of inflammation is very variable even in patients with similar characteristics.[5] Timing of anti-inflammatory agents and immune-suppressing medication is of utmost importance and early initiation of treatment can halt progression of disease. This inflammation is dynamic in COVID-19 and most people get anti-inflammatory treatment, either from the beginning as a standard protocol or with the inflammatory markers monitoring.[6] Optimal administration may prevent cytokine storms and abate the development of ARDS.[7] Markers of disease activity like ferritin, C-reactive protein (CRP), and D-dimers are frequently monitored to detect the best opportunity for timing of intensive treatment.[8] To avoid the unnecessary or inappropriate utilization of the healthcare resources, early prediction of the severity of COVID-19 will be helpful. Severity prediction will also improve the prognosis by reducing the mortality rate.[9]

MATERIAL AND METHODS

This study aimed to evaluate the role of inflammatory markers in estimating the severity and predicting the outcome of COVID-19. This was a descriptive cross-sectional hospital-based, prospective study conducted in Department of Internal Medicine, Universal College of Medical Sciences Teaching Hospital (UCMS-TH), Bhairahawa, Rupandehi, Nepal from 16 June 2021 to 15 September 2021. Ethical approval was taken from Institutional Review Committee of UCMS (Ref No.: UCMS/IRC/042/21). All the consecutive patients with severe COVID-19 pneumonia were taken in the study over the study period. We classified the disease severity according to the clinical classification of the WHO interim guidance.[10] CRP value was measured at time of presentation to emergency.

Sixty patients with severe covid 19 pneumonia and age more than 16 years were included in study. Two patient refusing consent and three patients who died before CRP values were sent were excluded from study. Total of 55 patients were enrolled in study. The frequency distribution of data based on age, sex, patient characteristics, comorbidities, symptoms and mean CRP value was calculated using SPSS version 20.0.
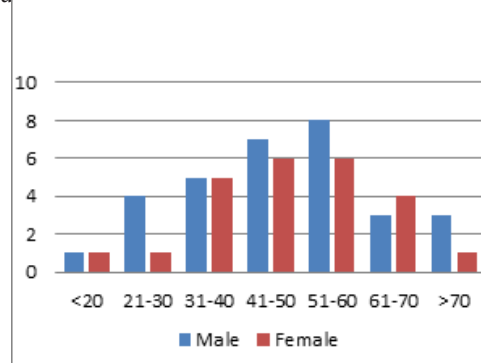
RESULTS

Out of 55 patient 31 (56%) were males and 24 (44%) were females.
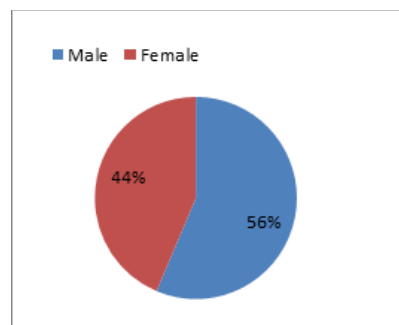
Figure 1. Sex distribution of cases

The median age was 46 years. In both sex most number of cases were found in 51-60 yrs followed by 41-50 years with less number at either extremity of age.
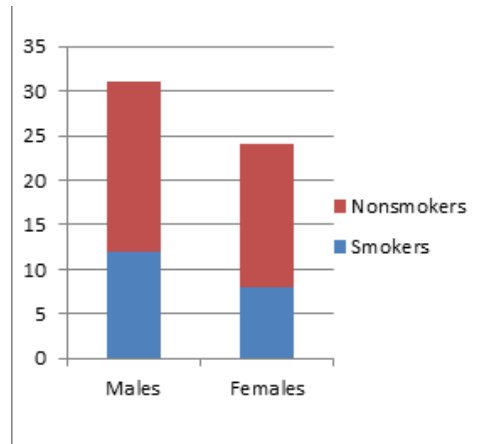

Figure 2. Age distribution of patients

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Cough was most common symptom of severe COVID-19 pneumonia occurring in 80% cases followed by dyspnea and fever as shown in Table 1.

Table 1. Symptoms of severe COVID-19 pneumonia

Symptoms	Frequency	Percentage
Cough	44	80%
Dyspnea	42	76%
Fever	40	73%
Fatigue	21	38%
Loss of smell/taste	16	29%
Sore throat	14	25%
Chest pain	7	13%
Myalgia	7	13%
Diarrhea	6	11%
Anorexia	6	11%
Vomiting	3	6%
Headache	2	4%

The occurrence of severe COVID-19 pneumonia was 36% in smokers and 63% in non-smokers.

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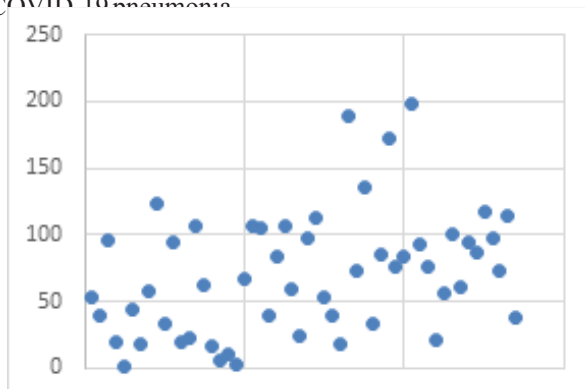Pushpa Raj Dhakal, Niraj Kumar Jaiswal, Manish Dahal, Manoj Karki

Figure 3. Patient characteristics

There was no comorbidity in 34% of cases. HTN was most common comorbidity followed by diabetes. Two males and three females had both type-2 DM and HTN.
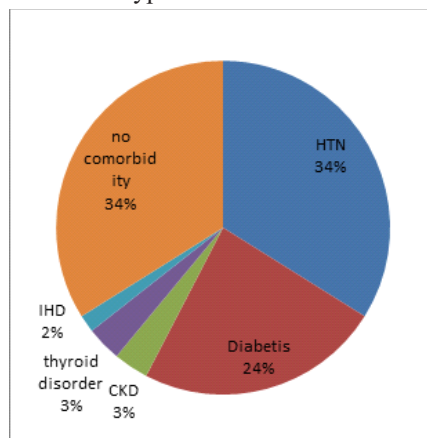
Figure 4. Distribution of comorbidity

The mean CRP value was 59.6 mg/l among patient with severe COVID-19 pneumonia.

Figure 5. Distribution of CRP values

DISCUSSION

Our study found mean age of 46 years and more number of males. This can be explained by traits of Nepalese population as explained by National Population and Housing Census 2011 (Village Development Committee/Municipality) Government of Nepal National Planning Commission Secretariat.[11] Our study showed severe COVID-19 pneumonia in 36% smokers, which is consistent with previous findings which showed active smoking and a history of smoking were clearly associated with severe COVID-19 pneumonia. Every smoker had a higher risk of having COVID-19 complications, such as acute respiratory distress syndrome, renal injury and acute liver injury compared with never smokers.[12] A meta-analysis with 16 articles detailing 11322 COVID-19 patients showed a relationship between a history of smoking and severe COVID-19 cases.[13] Cough, dyspnea and fever were the most common presenting symptoms in patients with severe COVID-19 pneumonia in our study. Similar presenting complaints were found in a study done by Patel S in Chitwan Nepal with fever, cough and dyspnea being the most common symptoms.[14] In a study done in Iran, dyspnea (72%), fever (61%) and cough (57%) were the most common symptoms.[15]

In our study hypertension and type-2 diabetes were two main comorbidities found in patients with severe COVID-19 pneumonia. Other studies also found hypertension and type-2 diabetes among most common comorbidity in patients with severe COVID-19 pneumonia.[14,16]

The findings of this study imply that quantitative CRP analysis can be useful in determining the severity of COVID-19 and may provide additional assistance for clinical treatment strategy planning. The severe COVID-19 group had a higher average CRP values 59.6 mg/l which was consistent with previous research findings.[14,17]

The degree of lymphopenia and a proinflammatory cytokine storm is higher in severe COVID-19 patients than in mild cases, and is associated with the disease severity. The average CRP values was 62.9 mg/l.[18] In severe covid cases higher incidences of shortness of breath and anorexia, higher neutrophil, aspartate aminotransferase, lactate dehydrogenase, and C-reactive protein levels, lower platelet counts and albumin levels, and higher incidences of bilateral pneumonia and pleural effusion were found. The mean CRP value was 46 mg/l.[19]

A study done in Wuhan China also found that average CRP in patients with severe COVID –19 was 47.6 mg/l.[20] Young et al also found mean CRP values of 65.6 mg/l in severe cases of covid 19 who required supplemental oxygen therapy.[21]

CONCLUSION

Elevated CRP level was associated with COVID-19 severity. Therefore, for early detection of severity of COVID-19, CRP on admission can be useful to facilitate the guidance of treatment decisions.

ORIGINAL ARTICLE

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