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Correlation Between Disease Severity And Hs Crp Among The Hospitalized Covid-19 Cases In Govt Dharmapuri Medical College & Hospital

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Abstract

Pneumonia mostly occurs in the second or third week of a symptomatic Covid infection. Hence, keeping a track of inflammatory markers like CRP becomes crucial. High CRP levels in COVID-19 cases can indicate the need for hospitalization and advanced treatment modalities. The study is to assess the usefulness of CRP levels in the early stage of COVID- 19 and to correlate them with lung lesions and severe presentation. 58 Covid positive cases were analysed and their blood CRP levels are estimated. CRP levels are correlated with the level of inflammation, and its concentration level is not affected by factors such as age, sex, and physical condition. This study showed that CRP levels and the diameter of the largest lung lesion increased as the disease progressed. CRP levels were positively correlated with lung lesion and disease severity. This suggests that in the early stage of COVID-19, CRP levels could reflect lung lesions and disease severity.

Keywords: NIL

Introduction

Coronavirus disease 2019 (COVID-19) is an emerging zoonosis caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) [1, 2]. Phylogenetically, SARS-CoV-2 sufficiently differs from other zoonotic coronaviruses, such as Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) and Middle East Respiratory Syndrome Coronavirus (MERS-CoV) introduced to humans in the past two decades [1, 3]. Disease resulting from infection with SARS-CoV-2 was first reported in Wuhan, China in December 2019, and the virus rapidly spread to other regions of the world thereafter [4, 5]. Given the scale of the outbreak, COVID-19 was declared a pandemic on March 12 2020 by the World Health Organization [6].To date, several clinical laboratory parameters associated with Coronavirus disease 2019 (COVID-19) severity have been reported. However, these parameters have not been observed consistently across studies. Though coronavirus is a respiratory virus that replicates in the nose, throat, and lungs, moderate or severe disease can cause hyperinflammation in the body. This dysregulated immune response can be lethal. In symptomatic patients, the clinical manifestations of the disease usually start after less than a week, consisting of fever (body temperature 37 to 38±C), cough, nasal congestion, and fatigue [(8)]. Pneumonia mostly occurs in the second or third week of a symptomatic infection [(9)]. Hence, keeping a track of inflammatory markers like CRP becomes crucial. Normally, CRP level in blood is less than 5 mg/L. According to a study that looked at the clinical characteristics of people with COVID-19, a

significantly elevated CRP levels (average 20 to 50 mg/L) were seen in COVID-19 cases. People who had severe COVID- 19 had a far elevated CRP level as compared to the people with mild disease. CRP elevations were observed in up to 86% in severe COVID-19 cases. Another study reported that while those who had severe symptoms had on average CRP levels of 39.4 mg/L, those with mild symptoms had an average CRP levels of 18.8 mg/L. Other evidence has also shown that CRP is increased at the initial stages in the moderate or severe group than those in the mild group.

High CRP levels in COVID-19 cases can indicate the need for hospitalization and advanced treatment modalities. In a study, people who died from COVID-19 had about 10 fold higher levels of CRP than those who recovered. CRP Test can pinpoint which COVID cases should get steroids. People with low CRP levels or (no elevation in CRP levels) can be highly likely to recover with just symptomatic treatment, as seen in clinical scenarios. Based on worldwide data and recommendations from experts, CRP test has become a requisite for people with COVID-19 admitted in hospitals. The aim of this review was to assess clinical laboratory parameters which may serve as markers or predictors of severe or critical COVID-19.

Relative to non-severe COVID-19, severe or critical COVID-19 is characterised by increased markers of innate immune response, decreased markers of adaptive immune response, and increased markers of tissue damage and major organ failure. These markers could be used to recognise severe or critical disease and to monitor clinical course of COVID-19.

The aim of our study is to assess the usefulness of CRP levels in the early stage of COVID-19 and to correlate them with lung lesions and severe presentation.

Material And Methods

The study was conducted on the hospitalized COVID-19 patients, admitted in Government Dharmapuri Medical College & Hospital, Tamilnadu, India from 01 May 2021 to 14 March, 2022. 58 patients who turned up Positive were included in the study based on the results of real time reverse transcriptase-polymerase chain reaction (RT-PCR) for COVID-19. Inclusion criteria: the criterion for confirming COVID-19 was a positive viral nucleic acid test, presenting within 7 days of clinical symptoms

Exclusion criteria: patients with bacterial infection, patients with onset more than 7 days before, and patients with incomplete data were excluded.

The study protocol was approved by the Institute Ethical Committee.

Inpatients with positive COVID-19 RT PCR tests having initial respiratory signs (including sore throat without shortness of breath), fever, cough, muscle ache, and headache were included.

Blood samples were collected from each participant and routine blood test including Complete Blood Count (CBC) were performed on the blood samples. We performed a retrospective study. On admission CRP levels were collected, and the diameter of the largest lung lesion was measured in the most severe lung lesion by lung CT scan. Differences in the diameter and CRP levels were compared in the following groups of patients: mild group, moderate group, severe group, and critical group. We observed a correlation between CRP levels, lung lesion diameter, and disease severity.

Statistical Analysis:

The statistical analysis was performed using the SPSS 24.0 software. Measurement data with normal distribution are expressed as mean ± standard deviation (mean ± SD), and comparisons among the groups were performed using the one-way analysis of variance (Anova) followed by LSD test (homogeneity of variance was determined). Numeration data was analyzed by chi-square test. Correlation was analyzed by Spearman correlation analysis. A P value below 0.05 was considered statistically significant.

Results:

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Comparison of CRP levels and lung lesions on admission in each group.

Parameter	Gender (male/Female)	Age (years)	CRP (mg/L)	Diameter of the largest lung lesion (cm)
Mild group	17/12	33.5 ± 12.4	1.52 ± 1.56	1.23 ± 1.43
Moderate group	10/9	35.6 ± 10.5	16.76 ± 18.38	2.94 ± 1.91
Severe group	5/2	41.5 ± 7.4	54.15 ± 1.06	9.15 ± 1.20
Critical group	2/1	42.5 ± 9.6	105.00 ± 12.73	17.00 ± 4.24

Parameter	CRP (mg/L)	Diameter of the largest lung lesion (cm)
Mild group: moderate group		
χ^2/u value	−2.647	−2.171
P value	0.007	0.034
Moderate group: severe group		
χ^2/u value	0.693	−2.177
P value	0.511	0.026
Severe group: critical group		
χ^2/u value	−0.068	−1.549
P value	0.947	0.333

Discussion:

The number of patients with COVID-19 is currently rapidly increasing globally, and asymptomatic patients are also the source of infection [5]. COVID-19-related case fatality is also rapidly increasing. COVID-19 is a new threat for populations [6], [7], [8], and treatment options need to be evaluated [9]. Early monitoring of key indicators was an important basis to guide treatment strategies, and early assessment of the severity of patients' condition was of great value [10]. The main pathological changes of COVID-19 are lung and immune system damage [4]. Serous, fibrin exudate and clear membrane form in the alveolar cavity and congestion and edema appear in the lung [11]. CT dynamic monitoring may be used to identify the characteristic imaging of lung changes: multiple small patch shadows and stromal changes are observed in the early stage and the lung exudate is obvious [12], which then develops into multiple ground-glass shadows and infiltrating shadows in both lungs [13]. CT scan examination, as a quick and simple method to screen for pulmonary infection, cannot only determine the presence of pulmonary infection but it can also provide a reference for determining the type of pathogen, with unique diagnostic advantages. According to Zhong Nanshan's latest research, the sensitivity of COVID-19 diagnosis with CT scan alone was 76.4%, and the application of CT scan in COVID-19 was evaluated as useful [14]. A 50% increase in lung X-ray findings within 24 to 48 hours was considered an early warning indicator of impending conversion to critical disease. The CT scan can sometimes predict the prognosis of patients [15]. Studies by Chen Lin et al. all suggested the value of the CT scan in the diagnosis and evaluation of COVID-19 [2]. Shortcomings of CT scan are the additional special protection required by medical personnel during

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examination of COVID-19 patients, the cost of protective equipment, and risks associated with the transportation and examination of critical patients. CT dynamic monitoring of lung lesions was limited. A simple index with good correlation with pulmonary pathological changes is required.

CRP levels are correlated with the level of inflammation, and its concentration level is not affected by factors such as age, sex, and physical condition [16]. CRP levels can activate the complement and enhance phagocytosis, thus clearing the pathogenic microorganisms invading the body. CRP levels can be used for early diagnosis of pneumonia [3], and patients with severe pneumonia had high CRP levels. It is an important index for the diagnosis and assessment of severe pulmonary infectious diseases [17]. Matsumoto's study also showed the value of CRP levels in severe pneumonia [18]. This study showed that CRP levels and the diameter of the largest lung lesion increased as the disease progressed. CRP levels were positively correlated with lung lesion and disease severity. This suggests that in the early stage of COVID-19, CRP levels could reflect lung lesions and disease severity.

Conclusion:

At the early stage of COVID-19, CRP levels were positively correlated with lung lesions. CRP levels could reflect disease severity and should be used as a key indicator for disease monitoring. It seems that, some blood laboratory parameters could be used in screening cases with positive RT-PCR for COVID-19.

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