



## SIGNIFICANCE OF C- REACTIVE PROTEIN IN COVID-19 PATIENTS AND IT'S CORRELATION WITH HRCT AND RT-PCR POSITIVE PATIENTS.

### Pathology

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|---------------------------|----------------------------------------------------------------------------------------------------------------------|
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### ABSTRACT

The outbreak of COVID-19 is an emerging global health threat. The 2019 coronavirus disease (COVID-19) is caused by the coronavirus 2 of the severe acute respiratory syndrome (SARS-CoV-2). Clinical studies demonstrated that altered levels of some blood markers associated with the degree of severity and mortality of patients with COVID-19. Of these clinical parameter, serum C-reactive protein (CRP) has been found as an important marker that changes severe patients with COVID-19 and it's correlation with HRCT and RT-PCR. This study included a total 100 patients. Mean level of CRP was significantly higher in severe cases with significant correlation. Majority of the patients from age group 30-60yrs were having severe disease. Levels of CRP and HRCT & RTPCR findings were significantly associated with the clinical stage of the disease.

### KEYWORDS

CRP, HRCT, RTPCR.

#### INTRODUCTION:

Coronavirus disease 2019 (COVID-19) is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and has evolved into a pandemic causing a public health crisis <sup>(1,2)</sup> It is diagnosed by detection of virus in respiratory secretions using Polymerase chain reaction (PCR) analysis. The course of disease is mild in the majority of patients with symptoms including sore throat, cough, breathlessness, fever and fatigue among others. In some patients, the disease may progress to viral pneumonia and acute respiratory distress syndrome (ARDS), finally leading to multi-organ failure. It is a viral disease, serum levels of C-reactive protein (CRP), a common bacterial infection marker are high. Further, CRP levels were consistently shown to correlate with the severity of the disease. Level of CRP correlate with Ct value of RT-PCR and HRCT findings and divided in to mild, moderate & severe disease, the overall clinical situation and the risk for the patient to need mechanical ventilation (3–10).

#### Aims & Objectives:

- To assess the usefulness of CRP level in the early stage of COVID-19.
- To determine how CRP level relate to lung lesions and severity of the disease.
- To use CRP level to predict the prognosis & mortality of individuals with COVID-19 infection.
- Use of CRP level to determine the effectiveness of treatment.

#### MATERIAL & METHODS:

##### Study Population :

A total of 100 patients were enrolled for the study from who attended the Covid-19 clinics of the tertiary care center.

##### Study Duration :

This study was conducted for a period of 2 year.

#### Assay Procedure:

- Blood samples of all the patients were collected during the course of hospital admission, in plain vacuette /bulb. Fresh serum is obtained by standing or centrifugation of the samples immediately after collection.
- 10 microliter of sample is taken in a test tube and with the help of ACCUCARE CRP–TURBILATEX (LATEX TURBIDIMETRY) kit with 1000 microliter working reagent.
- Run the mixture immediately on ERBA CHEM 5X semi automated biochemistry analyzer. Measurement of antigen-antibody reaction by two point kinetics method.
- Reading is taken after 3 minutes.

#### Assay Principle:

- CRP- turbilatex is quantitative latex based turbidimetric test for the measurement of C- reactive protein in human serum.
- Latex particles coated with specific anti-human CRP are agglutinated when mixed with sample containing CRP.
- This agglutination is detected as an absorbance change dependent upon the CRP contents of the patient sample that can be quantified by comparison from a calibrator of known CRP concentration.
- The linearity of the assay is 150 mg/L.

#### OBSERVATIONS AND RESULTS:

A total of 100 patients were enrolled for the study from who attended the Covid-19 clinics of tertiary care center. Clinical severity, CRP levels, HRCT findings and RTPCR of these patients were taken in to consideration.

In present study (Table- 1), we found that higher viral load (lower Ct value) corresponded with a higher CRP level.

**Table-1 : Correlation between Ct value and CRP level**

| RT-PCR(cycle threshold) value | Frequency | CRP value  |
|-------------------------------|-----------|------------|
| High Ct value (31-40)         | 20        | <40 mg/L   |
| Moderate Ct value (21-30)     | 58        | 40-100mg/L |
| Low Ct value (11-20)          | 22        | >100mg/L   |
| Total n= 100                  |           |            |

**Table-2.1 & 2.2 : Statistical correlation of CRP level with CT severity index**

**Table-2.1 : One Way ANOVA Test**

| SR. No | Group    | Frequency | Mean    | Standard Deviation |
|--------|----------|-----------|---------|--------------------|
| 1      | Mild     | 20        | 31.7350 | 9.44058            |
| 2      | Moderate | 58        | 52.7312 | 17.51051           |
| 3      | Severe   | 22        | 59.8183 | 39.07197           |
|        | Total    | 100       | 50.1620 | 24.97707           |

**Table-2.2:**

|                | Sum of Squares | df | Mean Square | F     | Significance |
|----------------|----------------|----|-------------|-------|--------------|
| Between Groups | 9311.937       | 2  | 4655.969    | 8.611 | .000361      |
| Within Groups  | 52449.588      | 97 | 540.717     |       | 1            |
| Total          | 61761.525      | 99 |             |       |              |

**Table 2.1 & 2.2** shows that difference of mean CRP of patients three groups accordingly severity of CT score. After applying the one way ANOVA test shows F value 8.611 and p value 0.003661133 that is statistically significant. There was a positive correlation between CRP

level and CT severity Index. ( $p=0.0036$ ).

## DISCUSSION:

1. According to Nag P et al may [11] 2022 Out of 502 patients, we found that 348 (69.3%) were males and 154 (30.7%) were females, with mean age  $48.084 \pm 14.32$  years. The most common complaints of the patients were shortness of breath ( $N=449$ , 89.4%), cough ( $N=428$ , 85.25%), fever ( $N=415$ , 82.66%), myalgia ( $N=283$ , 56.4 %), sore throat ( $N=280$ , 55.8%), headache ( $N=158$ , 31.47%), diarrhoea ( $N=42$ , 8.36%), vomiting ( $N=30$ , 5.97%). Most of the patients in our sample population had one or other underlying comorbid condition. They mostly suffered from diabetes mellitus ( $N=232$ , 46.21%), hypertension ( $N=210$ , 41.83%), obstructive airway disease ( $N=98$ , 19.52%), ischemic heart disease ( $N=95$ , 18.9% ), chronic kidney disease ( $N=72$ , 14.34%), cerebrovascular accident ( $N=65$ , 12.9%), hypothyroid ( $N=52$ , 10.35%), chronic liver disease ( $N=15$ , 2.9%), malignancy ( $N=8$ , 1.59%). On arrival, patients were categorized into mild, moderate or severe COVID cases, based on the clinical features and provided, Out of 502 patients, 158 patients were (31.5%) mild case, 228 patients (45.4%), moderate case, and 116 patients (23.1%) severe case.

2. Hesam – shariti et al [12] (2022) study showed the changes following chest CT scans, the most common imaging manifestation was ground-glass opacity (72.33%). Various studies have similarly reported that GGO is the most common change on CT images, followed by consolidation. In our present study showed most commonly found ground glass opacities (26%) followed by consolidation (22%), vascular enlargement (21%), Architectural distortion (14%), Sub pleural band (10%) and crazy paving (7%).

3. In Nag P et al study [11] Out of 502 patients, 158 patients were (31.5%) mild case, 228 patients (45.4%), moderate case, and 116 patients (23.1%) severe case. Of which 214 (42.6%), ANOVA test was used to compare CRP values and CTSS among patients categorized as mild, moderate, severe diseases clinically, which showed Statistically significant,  $p$  value  $<0.001$ . In present study out of 100 patients, 20 (20%) were mild case, 58 (58%) moderate case and 22 (22%) severe case.

4. In our present study showed that there was strong positive correlation of increment in CT severity score and male sex. Also, there was significant correlation of CT severity score and increasing age. Results age group (30-60 years) was the commonest age group that was affected by COVID 19 and least affected group was ( $<30$  years) We observed most of the patients had CRP level in between 40- 100 mg/L (59%) followed by  $<40$  mg/L level in 26% and  $>100$  mg/L in 15% patients. The impact of these findings the routine assessment of serum CRP as an adjunct in the early diagnosis and assessment of illness severity of hospitalized patients with COVID 19. Most of the patients (59%) were present in between 40-100 mg/L CRP level. We recommend that CRP  $> 40$  mg/L on admission may indicate an increased risk of disease progression and death. CRP level and the lung involvement in CT score higher in Moderate group were higher than those in the mild group and those in severe group were higher than those in moderate group. Both CRP and Lung involvement increase with disease progression. CRP was positively correlated with lung involvement and severe presentation.

5. In this study, patients with mild disease had lower Ct values and possibly higher viral loads they had also been tested earlier than those with severe disease. However in patients with severe disease the Ct values of those who died were significantly lower than those who survived; but at the same time these patients had shorter duration of symptoms before testing.

In this present study, we found that higher viral load (lower Ct value) corresponded with a higher CRP level.

## CONCLUSION:

In this research study have revealed that increased CRP level is associated with disease progression. Besides, we found that a higher viral load (lower Ct value) and CT severity score corresponded with a higher CRP level.

CRP can be helpful in places where CT is not available. CRP play a crucial role in early suspicion, diagnosis, monitoring, and recognition of complications, management and disposition of patients. Each of

these components in turn can have crucial implications on the healthcare system and the administrative machinery, directly impacting patient care.

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