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# PREVALENCE OF HYPERINFLAMMATION IN COVID-19 PATIENTS AND ITS CORRELATION WITH THE INFLAMMATORY MARKERS: A DESCRIPTIVE OBSERVATIONAL STUDY

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**ABSTRACT** The diagnostic criteria for hyperinflammation are incompletely defined, especially in the context of COVID-19. Early studies of patients with COVID-19 established independent associations between biomarkers of inflammation (such as C-reactive protein, interleukin [IL]-6, and ferritin) and severe disease (i.e., requiring respiratory support or resulting in death).1,2 Subsequent prospective studies have confirmed these associations in large cohorts of people admitted to hospital with COVID-19 and critical illness has been proposed to be more strongly associated with high levels of inflammatory biomarkers (C-reactive protein concentration >200 mg/L and D-dimer concentration >2500 mg/L) than with age or comorbidity. This evidence has formed the basis for initial predictive models and decision aids for patients at risk of a poor outcome.3

**KEYWORDS :** crumb rubber, utilization, compressive strength, low cost, sustainable, cytokine ,corona virus,covid-19,pandamic,macrophage,c-reactive protien

## INTRODUCTION

The COVID-19 pandemic is a global outbreak of coronavirus, an infectious disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus.

The first cases of novel coronavirus (nCoV) were first detected in China in December 2019, with the virus spreading rapidly to other countries across the world. This led WHO to declare a Public Health Emergency of International Concern on 30 January 2020, and to characterize the outbreak as a pandemic on 11 March 2020.

Granulocyte macrophage colony-stimulating factor (GM-CSF) is an immunoregulatory cytokine with a pivotal role in initiation and perpetuation of inflammatory diseases. GM-CSF could link T-cell-driven acute pulmonary inflammation with an autocrine, self-amplifying cytokine loop leading to monocyte and macrophage activation. This axis has been targeted in cytokine storm syndromes and chronic inflammatory disorders. Here, we consider the scientific rationale for therapeutic targeting of GM-CSF in COVID-19-associated hyperinflammation.

The present descriptive observational study was carried out at Department of Pulmonary Medicine ,MNR, Sangareddy during the period of June to December 2021 by involving 104 RTPCR positive cases of confirmed covid 19 and details of inflammatory markers along with hyperinflammation were studied. The data was analysed using SPSS 24.0 version

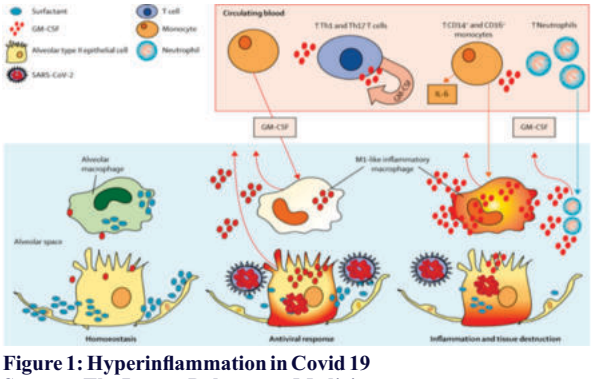


**Figure 1: Hyperinflammation in Covid 19**
**Sources: The Lancet Pulmonary Medicine**

**Table – 1Distribution of cases according to hyperinflammation and elevated CRP values**

| Hyperinflammation | CRP on Day 1 | | | | Total | p | Inference |
|---|---|---|---|---|---|---|---|
| | Normal | | Elevated | | | | |
| | No | % | No | % | | | |
| Present | 0 | 0.0 | 35 | 33.7 | 35 | 0.21 | Not significant |
| Absent | 3 | 2.9 | 66 | 63.5 | 69 | | |
| | CRP on Day 4 | | | | | | |
| Present | 0 | 0.0 | 35 | 33.7 | 35 | 0.21 | Not significant |
| Absent | 3 | 2.9 | 66 | 63.5 | 69 | | |
| | CRP on Day 7 | | | | | | |
| Present | 1 | 1.0 | 34 | 32.7 | 35 | 0.005 | Highly Significant |
| Absent | 17 | 16.3 | 50 | 48.1 | 67 | | |
| | CRP on Day 10 | | | | | | |
| Present | 6 | 5.8 | 21 | 20.2 | 27 | 0.42 | Not significant |
| Absent | 11 | 10.6 | 24 | 23.1 | 35 | | |

**Table -2 Comparison of mean ferritin values at subsequent intervals with respect to outcome**

| | Outcome | N | Mean | Std. Deviation | t | p | Inference |
|---|---|---|---|---|---|---|---|
| Ferritin Day 1 | Death | 22 | 883.51 | 661.9 | 1.787 | 0.077 (<0.05) | Highly significant |
| | Discharge | 82 | 645.97 | 521.82 | | | |
| Ferritin Day 4 | Death | 22 | 1021.94 | 544.52 | 2.711 | 0.008 (<0.01) | Highly significant |
| | Discharge | 82 | 689.12 | 502.33 | | | |
| Ferritin Day 7 | Death | 22 | 1162.03 | 531.94 | 5.473 | 0.0001 (<0.01) | Highly significant |
| | Discharge | 80 | 569.02 | 425.74 | | | |
| Ferritin Day 10 | Death | 18 | 1361.11 | 476.36 | 6.47 | 0.0001 (<0.01) | Highly significant |
| | Discharge | 44 | 568.6 | 421.61 | | | |

As a measure of hyperinflammation, we have defined CRP levels more than 10 mg/dL and serum ferritin level more than 400 ng/ml anytime during the course of hospital stay.

Based on these two parameters, we have divided the subjects into two cohorts, i.e. those with presence of hyperinflammation and those with absence of hyperinflammation For assessing the disease severity, we divided our patients into three categories –

Mild - Patients who did not require any oxygen support (i.e those on room air) and patients who required low oxygen support i.e. < 4 litres/min anytime during the course of hospital stay

Moderate - Patients who required high oxygen support i.e. > 4 litres/min anytime during the course of hospital stay

Severe – Patients who required High Flow Nasal Cannula (HFNC) or

Non Invasive Ventilation (NIV support) or Mechanical Ventilation (MV) anytime during the course of hospital stay.

## CONCLUSIONS :

1. Prevalence of hyperinflammation was 33.7%.
2. We observed significant association between hyperinflammation and inflammatory markers.
3. We also observed significant association between hyper inflammation and outcome.

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