



## A STUDY ON HAEMATOLOGICAL ABNORMALITIES IN COVID AN OBSERVATIONAL STUDY

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**ABSTRACT** **Introduction:** COVID 19 diseases caused by SARS CoV2 virus affecting many people in and around the world causing mortality and morbidity . to predict the outcome and assessing the prognosis of patients affected with COVID 19 some biomarkers are required few such markers are haematological markers which have their impact on covid 19 disease. **Materials And Methods:** This is a retrospective study done in the RTPCR positive covid 19 patients who are admitted in government general hospital Vijayawada during march 2022 to June 2022 with inclusion criteria as all covid 19 RTPCTR positive patients who are 18 years and above of age are included in the study and exclusion criteria as RTPCR negative and age less than 18years. **Results:** As an observational study out of 100 patients 63 were males, 37 were females , majority of individuals belongs to 45 to 55years of age. 18 patients had normal complete blood picture with out any abnormalities. In the remaining patients 19 has anaemia, 52 has leucopenia ,9 has thrombocytopenia,2 has pancytopenia . Out of 100 patients 24 had elevated serum ferritin levels, 26 had elevated D-Dimer levels ,38 had elevated LDH levels. **Discussion:** SARS patients commonly manifest lymphopenia, thrombocytopenia, and leukopenia. During the onset of SARS, patients exhibit a reduction in peripheral CD4+ and CD8+ T lymphocytes. In the present study, we concentrated on the value of the hematological ratios as NLR, our results supported a previous study that indicated that elevated NLR predicts poor outcome in COVID-19 patients so that those with high NLR attract more attention than those with low NLR. C-reactive protein (CRP), d-dimer and ferritin, are markers that are extensively studied in COVID-19 infected victims. **Conclusions:** Common hematological abnormalities in COVID-19 are lymphopenia, thrombocytopenia, and elevated D-dimer and CRP levels. These alterations are significantly more common/ prominent in patients with severe COVID-19 disease, and thus may serve as a possible biomarker for those needing hospitalization and ICU care.

**KEYWORDS :** COVID, HAEMATOLOGICAL ABNORMALITIES, NEUTROPHIL LYMPHOCYTE RATIO

### INTRODUCTION:

COVID-19 virus, which is a RNA virus,<sup>(1)</sup> causes multisystemic infections in animals and humans, mainly leads to respiratory tract infection.<sup>(2)</sup> Classically patients develop mild symptoms such as fever, sore throat, and upper respiratory tract infections.<sup>(3)</sup> Severe respiratory tract infection leads to syndrome of adult respiratory distress, multiple organ failure, and even death is reported, mainly in the elderly, patients with comorbidities.<sup>(4)(5)</sup> Declaring COVID-19 as a pandemic, serious morbidity, and mortality; created an urgency to study diagnostics, treatment, and prognostic markers.<sup>(6)</sup> Inflammatory biomarkers which show the immune status are probably the predictors of prognosis for COVID-19.<sup>(7)</sup> Hematological ratio such as neutrophil to lymphocytatio (NLR) , platelet to lymphocyte ratio (PLR), and lymphocyte to monocyte ratio (LMR) are systemic inflammatory markers that have already been extensively investigated as a potential predictor of viral pneumonia.<sup>(8)</sup> Such ratios are useful, inexpensive prognostic indicators that can be widely tested in developing countries in viral pneumonia, including COVID-19.<sup>(9)</sup> The corresponding rates in Middle East respiratory syndrome coronavirus (MERS-CoV) infections were as follows: lymphopenia (44–60%) and thrombocytopenia (31–40%).<sup>(7)</sup> In a meta-analysis performed early in the pandemic, significant thrombocytopenia was reported in patients with more severe than mild disease.<sup>(8)</sup>

### MATERIALS AND METHODS:

This is a retrospective study done in the RTPCR positive covid 19 patients who are admitted in government general hospital Vijayawada during march 2022 to June 2022.

#### Inclusion Criteria:

All covid 19 RTPCTR positive patients who are 18 years and above of age are included in the study

**Exclusion Criteria:** RTPCR negative and age less than 18years.

### RESULTS:

A total of 100 patients were include in the study who were tested RTPCR positive and blood tests were sent to lab with in 24hours of admission .63 were males, 37 were females , majority of individuals belongs to 45 to 55years of age .out of 100 patients 18 patients had normal complete blood picture with out any abnormalities. In the remaining patients 19 has anaemia, 52 has leucopenia ,9 has

thrombocytopenia,2 has pancytopenia .

Out of 100 patients 24 had elevated serum ferritin levels, 26 had elevated D-Dimer levels ,38 had elevated LDH levels . At the time of presentation 62 patients who are having mild stage of disease have their NLR ratio with in normal limits and all are discharged, and out of 28 patients who are having moderate stage of disease at the time of presentation 9 has high NLR ratio and out of these 2 were succumbed to death and 19 having mild increase in NLR ratio were discharged ,and in remaining 10 patients who are having severe stage of disease NLR ratio was high and out of these 4 were discharged and remaining 6 were succumbed to death. Hence NLR was one of the prognostic factor which can be helpfull used in assessing the outcome of the patients .

### DISCUSSION:

SARS patients commonly manifest lymphopenia, thrombocytopenia, and leukopenia. During the onset of SARS, patients exhibit a reduction in peripheral CD4+ and CD8+ T lymphocytes . A retrospective cohort study comprising 16 MERS-CoV-infected patients showed that 31% and 40% of the patients developed thrombocytopenia on day 1 and 21, respectively . Similarly, a retrospective study performed on patients with COVID-19 ( $n = 1099$ ) showed 82.1% and 36.2% of patients with lymphopenia and thrombocytopenia on admission, respectively, and 33.7% of patients with leukopenia . In the present study, we concentrated on the value of the hematological ratios as NLR, our results supported a previous study that indicated that elevated NLR predicts poor outcome in COVID-19 patients so that those with high NLR attract more attention than those with low NLR.<sup>(9)</sup> It is well established that NLR tends to increase with severe infection or systemic inflammation in line with the magnitude of clinical status and outcome.<sup>10</sup> NLR, as well as, age were independent factors for poor clinical outcome of COVID-19 in Chinese cohort. NLR was one of the earliest studied markers that were correlated with severity.<sup>11</sup> C-reactive protein (CRP), d-dimer and ferritin, are markers that are extensively studied in COVID-19 infected victims<sup>12</sup>. CRP levels correlate with the degree of inflammation. Interestingly, it was found to increase parallel to the increase in the diameter of the largest pneumonia lesion in COVID-19 patients;19 this supports our findings in which CRP is least in the non-severe group. D-dimer  $>2$  was found in an early study to be the only factor associated with mortality in COVID-19 patients<sup>13</sup>, this is also observed in our results, where it was highest in the patients having severe stage of disease. Hyperferritinemia in a large meta- analysis

found to be associated with severe conditions and adult respiratory distress syndrome (ARDS).<sup>14</sup> However, Wu et al found that ferritin was neither associated with ARDS nor severe cases of COVID-19.<sup>15</sup> Surprisingly, in ours, mean ferritin levels favored the severe group, not the critical one. In addition to the Bone marrow, megakaryocytes (MK) and hematopoietic progenitors have been detected in the blood vessels outside the lung tissue. During thrombocytopenia or a reduction in BM-derived haematopoietic stem cells, hematopoietic progenitors migrate from the lung to the BM, regenerate different blood cells, and supplement the number of platelets. MKs outside pulmonary vessels are smaller than those inside; further, and MKs inside the pulmonary vessels alone release platelets<sup>16</sup>. SARS-CoV-2 infection is associated with ACE2-induced lung injury. This can be attributed to multiple mechanisms. When the virus attacks the lungs, viral replication ensues in the invaded cells that results in the apoptosis of epithelial and endothelial cells and vascular leakage, thereby triggering the release of high concentrations of pro-inflammatory cytokines and chemokines<sup>17</sup>. The lungs of patients with SARS exhibit diffuse alveolar damage with pulmonary congestion, edema, formation of hyaline membrane, and fibrosis. Majority of the hospitalized COVID-19 patients have pneumonia. Chest computed tomography scans reveal ground-glass opacity and bilateral patchy shadowing in patients with COVID-19; however, these patients do not exhibit pulmonary fibrosis as prominently as patients with SARS<sup>18</sup>. Extensive alveolar damage reduces the availability of effective capillary beds in the lung and affects MK fragmentation and production of platelets for pulmonary microcirculation, thereby leading to thrombocytopenia<sup>19</sup>. Hemophagocytosis has been noted in the bone marrow aspirates of three severe COVID-19 patients. There was an increase in pleomorphic megakaryocytes, plasma cells, macrophages, and hemophagocytosis. Rapkiewicz et al<sup>20</sup> found increased numbers of megakaryocytes in the bone marrow, with morphology pointing to active platelet production. Rare virions were also identified in bone marrow megakaryocytes using electron microscopy.

#### CONCLUSION:

Hematological indices including platelet count, absolute lymphocyte count, neutrophil count, NLR, and D-dimer play a valuable role in diagnosis, risk stratification, and prognosis of patients hospitalized with COVID-19 during early stages of infection and has impact on outcome.

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