

# THROMBOCYTOPENIA AND DISEASE SEVERITY AMONG COVID 19 PATIENTS

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## **ABSTRACT**

**Background:** Thrombocytopenia in covid 19 patients were important for treatment and management of the disease. Main objective of the study was to assess thrombocytopenia and its association with disease severity among covid 19 patients. **Methods:** A cross-sectional study was conducted among 160 patients from April 2020 to December 2020. Sociodemographic and clinical data were collected. Thrombocytopenia has been implicated in patients infected with SARS Cov 2. **Results:** Among 160 patients, majority were males with mild severity. Platelet count were decreased in severe cases when compared to mild and moderate severity cases and found to be statistically significant ( $p < 0.05$ ). **Conclusion:** platelet count was an independent risk factor for COVID 19 patients.

**Key words:** Covid 19, Platelet count, Disease severity, Thrombocytopenia

## **INTRODUCTION**

COVID-19, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), produces a wide range of illness which progresses to a severe form of pneumonia in 10–15% of patients [1]. Severe COVID-19 can lead to critical illness, with acute respiratory distress (ARDS) and multi-organ failure (MOF) as its primary complications, eventually followed by intravascular coagulopathy [2].

Thrombocytopenia has been implicated in patients infected with severe acute respiratory syndrome, while the association of platelet count and changes with subsequent severity remains unclear. Platelets are small, anucleate cell fragments of megakaryocytes. The role of

platelets is not only limited to haemostatic process but also modulates host response and virus survival via release of soluble inflammatory mediators, further leading to platelet activation[3,4,5]

Platelet count is a simple and readily available biomarker, which is independently associated with disease severity and risk of mortality in the intensive care unit (ICU). Moreover, a low platelet count correlates with higher disease severity scores such as Multiple Organ Dysfunction Score (MODS).[6,7,8]

In the severe acute respiratory syndrome (SARS) outbreak, thrombocytopenia was reported to occur in up to 55% of patients and was identified as a significant risk factor for mortality [9], [10]. Platelet count, with hypoxemia, were the only two variables used by Zou et al. for developing a SARS prognostic model which displayed 96.2% accuracy [11].

Thrombocytopenia in COVID-19 patients is caused by a variety of mechanisms. One of the postulated mechanisms is that coronaviruses may infect bone marrow cells, resulting in abnormal hematopoiesis and finally causes a low platelet production. The other possible mechanism may be due to viral infection and inflammation that results in lung damage. This leads to activating platelets in the lungs, resulting in aggregation and formation of micro-thrombi, which increases platelet consumption. Autoimmunity may be another potential player that induces antiphospholipid antibody production which was verified in various viral infections. COVID-19 may raise levels of auto-antibodies and immune complexes, causing the immune system to specifically destroy platelets.[12] Objective of the study was to assess the association of thrombocytopenia and COVID-19 severity.

## **MATERIALS AND METHODS**

It is cross sectional prospective study conducted at department of pathology, Bangalore medical college and research institute for a period of 6 months (April 2020 to December 2020-Total 160 cases) In the present study, we aim to investigate whether platelet count could differentiate between COVID-19 patients with or without severe disease, and assess if thrombocytopenia may be associated with severe COVID-19. All CBC samples received at central laboratory; Department of pathology was included in the study. EDTA blood samples received was checked for the details of the patient and was processed by Beckman LH 780 analyzer to obtain platelet count. Normal platelet count :  $150-450 \times 10^9 /l$ . Haematology analyzer uses the impedance principle in which constant electric current is passed through an isotonic solution. Then it measures the changes in electrical resistance that occur when blood cells pass through the detection aperture.

To maintain the quality of the laboratory results, preanalytical , analytical and post analytical precautions of quality and the standard operating procedure(SOP) were strictly followed.

Clinical severity of the patients is graded as mild, moderate and severe based on established criteria. Statistical tools are applied to look for any evidence of association between platelet indices and clinical severity.

Clinical severity: categorized as mild, moderate and severe. Patient with mild illness may exhibit variety of signs and symptoms (eg: fever, cough, sore throat, malaise, headache etc.

They do not have shortness of breath, dyspnoea on exertion or abnormal imaging. Moderate illness is defined as evidence of lower respiratory disease during clinical assessment or imaging with  $\text{Spo}_2 \geq 94\%$  on room air at sea-level. Respiratory rate  $< 30$  breaths /min. Patient with covid 19 is considered to have Severe illness, if they have  $\text{Spo}_2 < 94\%$  on room air at sea-level,  $\text{Pao}_2/\text{Fio}_2 < 300$  mmHg and Respiratory rate  $> 30$  breaths /min or lung infiltrates  $> 50\%$ .<sup>13</sup> Platelet count obtained is documented and recorded and was correlated with disease severity.

## STATISTICAL ANALYSIS

Statistical analysis will be performed by SPSS software version. All data of the demographic and clinical characteristics were analysed by descriptive statistics such as mean, standard deviation and percentage. Tables and graph were added wherever applicable. We used Student t- test and ANOVA to determine significant difference between two or more groups. A P value of  $< 0.05$  was considered statistically significant.

## RESULTS

Out of the Overall, 160 laboratory -confirmed covid 19 patients were enrolled in our study, among which 120(75%) patients were mild, 30 (18.75%) was moderate, and 10(6.2%) were severe. In our study, 125(75%) were males, 35(25%) were females, Age ranged from 20-91 years. Majority of the mild severity cases presented as asymptomatic with fever and sore throat, Moderate and severe cases presented as cough, fever and breathlessness.

**Table 1: Association of platelet Count with disease severity**

Laboratory findings are summarized in (table 1). In our study the Mean platelet count in mild cases were 3.02 lakhs/cumm, moderate cases showed 2.40 lakhs/cumm and in severe cases 1.25 lakhs/cumm. Platelet counts were decreased in severe cases when compared to mild and moderate severity cases and found to be statistically significant ( $p < 0.05$ ).

Laboratory Findings	Mild (N- 120) Mean±SD	Moderate (N-30) Mean±SD	Severe (N-10) Mean±SD	P-value
Platelet count	3.02+ 1.78	2.40+ 1.39	1.25+0.85	0.0001

## DISCUSSION

Covid 19 is a novel infectious disease caused by coronavirus (SARS Cov2), produces respiratory and systemic illness which progress to develop ARDS, multiorgan failure followed by Intravascular coagulopathy. Majority of the studies revealed a decrease in number of platelets with severe COVID 19.

Thrombocytopenia is detected in 5–41.7% of COVID-19 patients (the incidence varies according to disease severity. [14,15,16]

The present study was done to document the role of platelet count in covid 19 patients and to look for any association between platelet count and clinical severity in covid 19 patients. We analyzed the demographic, epidemiological, clinical and laboratory characteristics of 160 patients who were hospitalized.

In a study done by xiao long zong et al showed that 12% of hospitalized patients with COVID-19 have Thrombocytopenia, which also represents a sign of more severe illness and poor outcomes.[17]

Mechanism of thrombocytopenia in SARS COV 2 is poorly understood, however there are several explanations. Diffuse alveolar damage by virus would cause platelet activation, aggregation, and thrombi formation at the site of injury resulting in consumption of platelets and megakaryocytes. In addition, SARS Cov 2 directly infect hematopoietic precursor cells and inhibit their growth and may induce growth inhibition by binding to CD13 OR CD66a of hematopoietic cells and bone marrow stromal cells, resulting in abnormal hematopoiesis. Following viral infection, the cytokine storm destroys bone marrow progenitors cells and leads to a decrease in platelet production. [18,19]

In the present study, thrombocytopenia was seen in 24% of the covid 19 patients, This might be due to Covid 19 patients having higher level of p selectin expression and activated platelets, elevated circulating platelet leukocyte aggregates, increased aggregation and thromboxane generation. This leads to platelet consumption. [20,21]

The current study revealed that the assessment of thrombocytopenia and its association with disease severity of COVID 19. Thrombocytopenia was seen in severe and moderate cases when compared to mild cases. Platelet count was significantly lower in severe cases. The presence of thrombocytopenia may indicate some forms of coagulopathy with increased risk of thrombotic events.[ 22] Early identification of severe patients will improve patient outcome and reduce mortality.

### **Limitations of the study**

Determining the severity of the disease with a simple and inexpensive test might have social benefits and might help the community for future studies. However current study has limitations, First study was conducted in first wave of covid, and it was a single center study. Second the sample size was small.

### **CONCLUSION**

Thrombocytopenia was presented in 24% of covid 19 patients, It was significantly associated with disease severity, However, still most of the moderate patients did not have thrombocytopenia. Thus thrombocytopenia can be used as a risk stratification markers in COVID 19 Patients. Furthermore, larger sample size is needed to verify the current findings.

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