



## STUDY OF HEMATOLOGICAL MANIFESTATIONS IN COVID-19 INFECTED PATIENTS AND THEIR OUTCOME-OBSERVATIONAL RETROSPECTIVE LONGITUDANAL STUDY

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### ABSTRACT

**Background** COVID-19 is an ongoing global pandemic. Changes in haematological characteristics in patients with COVID-19 are emerging as important features of the disease. We aimed to explore the haematological characteristics and related risk outcome in patients with COVID-19. **Objectives:** 1.To study haematological manifestations in patients with COVID-19 infected patients. 2.To study the severity of covid 19 infection with respect to thrombocytopenia. **Materials and methods:** Observational retrospective longitudinal study done on patients admitted to general medicine department of S Nijalingappa Medical College and HSK hospital, Bagalkot, Karnataka. Patients with COVID-19 Pneumonia are included in the study after meeting inclusion and exclusion criteria **Results:** Data from 96 patients admitted to hospital with confirmed COVID-19 were analysed in our study .The patients with severe and critical disease were older than those with moderate disease. Women had more severe disease than men. Of the haematological parameters neutrophil count, lymphocyte count, neutrophil to lymphocyte ratio(NLN ) and platelet count were significantly different across all comparisons. Counts of platelets were significantly lower in patients with severe disease.( $p < 0.0001$ ). In the present study majority of the patients have NLN ratio  $> 3.5$ (59.4%).Death have occurred more in patients with  $> 3.5$  NLN ratio i.e; 52% in patients with NLN ratio  $> 3.5$ . In the present study most of the patients have platelets between 1.5lakh to 2 lakh.But the mortality is more in between 50,000-1,00,000 platelet i.e; 32.4%. **Conclusion:**The study of haematological parameters mainly thrombocytopenia and NLN ratio helps in assessing the severity of disease and the outcome. An early diagnosis and recognition of severe COVID-19 infection with these parameters helps in preventing future mortality and helps in the proper management of the disease.

### KEYWORDS :

#### INTRODUCTION:

In December, 2019, an outbreak of COVID-19 caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) occurred in Wuhan, China' and has rapidly infected people across the world. COVID-19 presents as complicated clinical manifestations, from flu-like symptoms to multiple organ failure and death. Nearly 20% of patients with COVID-19 become critically ill, with a high mortality ranging from 8-1% to 33%.<sup>1-3</sup> According to the diagnosis and treatment protocol for novel coronavirus pneumonia published by the National Health Commission of India, there are four severity levels of COVID-19 based on the clinical manifestations: mild, moderate, severe, and critical disease. To some degree, differentiating severe patients from non-severe patients is helpful and can improve the cure rate of COVID-19. However, the criteria used for classification are respiratory factors such as respiratory rate, oxygen saturation and lesions in pulmonary imaging.

Severe, especially critical, cases are usually complicated by other organ dysfunctions, including septic shock, heart failure, and disseminated intravascular coagulation (DIC)<sup>4,5</sup>.In clinical practice, some thrombotic complications have been reported, including ischaemic limbs, strokes, and venous thromboembolism. Venous thromboembolism is common in patients with severe disease<sup>6-11</sup>. Although several studies reported that decreased platelet count and increased D-dimer were associated with severe COVID-19 and high mortality<sup>4,12,13</sup>, Coagulopathy is also common in patients with critical and fatal disease<sup>2,3</sup>. Therefore, finding efficient haematological parameters for risk classifications and to predict prognosis is a priority.

Here, we present a multicentre retrospective analysis to uncover the role of the haematological system in COVID-19 and explore the haematology parameters for stratification and prognosis of critical cases of COVID-19.

#### OBJECTIVES OF THE STUDY

1. To study haematological manifestations in patients with COVID-19 infected patients.
2. To study the severity of covid 19 infection with respect to thrombocytopenia.

#### METHODOLOGY

**Study design:** observational retrospective longitudinal study.

#### Source of study population:

Patients admitted and treated SNMC and HSK Hospital Bagalkot.

Study duration-August 1st to September 31<sup>st</sup> 2019 at SNMC and HSK Hospital Bagalkot

#### Inclusion criteria:

1. RTPCR positive COVID-19 report above 18 years.

#### Exclusion criteria

1. SARI patients with COVID-19 RTPCR negative report
2. Vaccinated individuals

Sample size=  $n = 96$

by the formula,

Sample size  $n = [DEFF * Np(1-p)] / [(d^2 / Z^2) * (N-1) + p * (1-p)]$

At 95% confidence interval and 80% power

Data collection-Record based study on patients admitted with COVID-19 infection under department of general medicine. Data collected from medical record department, SNMC and HSK hospital.

#### RESULTS:

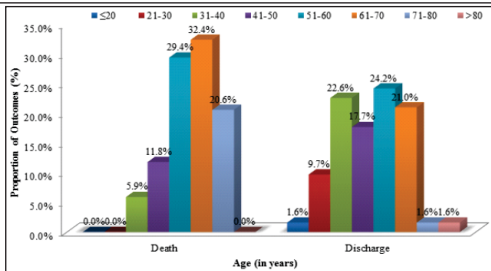
Data from 96 patients admitted to hospital with confirmed COVID-19 were analysed in our study .The patients with severe and critical disease were older than those with moderate disease. Women had more severe disease than

men. Of the haematological parameters neutrophil count, lymphocyte count, neutrophil to lymphocyte ratio and platelet count were significantly different across all comparisons. Counts of platelets were significantly lower in patients with critical disease than those with severe disease.(p<0.0001). In the present study majority of the patients have NLN ratio >3.5(59.4).death have occurred more in patients with >3.5 NLN ratio i,e; 52% in patients with NLN ratio >3.5. In the present study most of the patients have platelets between 1.5lakh to 2 lakh.But the mortality is more in between 50,000-1,00,000 platelet i,e; 32.4%.

**Table 1: Relation between age groups and outcome**

Age (in years)	Death 34 (35.4%)	Discharge 62 (64.6%)	Total 96 (100.0%)
≤20	00 (00.0%)	01 (01.6%)	01 (01.0%)
21-30	00 (00.0%)	06 (09.7%)	06 (06.2%)
31-40	02 (05.9%)	14 (22.6%)	16 (16.7%)
41-50	04 (11.8%)	11 (17.7%)	15 (15.6%)
51-60	10 (29.4%)	15 (24.2%)	25 (26.0%)
61-70	11 (32.4%)	13 (21.0%)	24 (25.0%)
71-80	07 (20.6%)	01 (01.6%)	08 (08.3%)
>80	00 (00.0%)	01 (01.6%)	01 (01.0%)

$\chi^2 = 19.419; df = 7; p = 0.003, Significant$

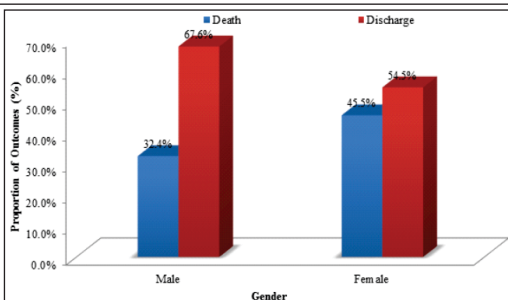


**Graph 1:** Showing the relation between age and outcomes. Most of the age groups are in 5th (51-60) and 6th decade(61-70). 25 and 26% respectively. Where as mortality is more between 61-70 years.

**Table 2: Relation between gender and outcomes**

Gender	Death 34 (35.4%)	Discharge 62 (64.6%)	Total 96 (100.0%)
Male	24 (32.4%)	50 (67.6%)	74 (77.1%)
Female	10 (45.5%)	12 (54.5%)	22 (22.9%)

$\chi^2 = 1.257; df = 1; p = 0.313, Not significant$

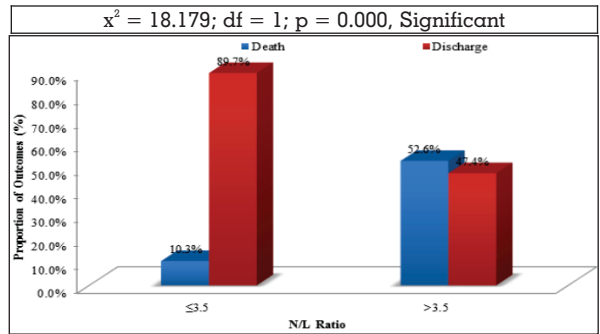


**Graph2:** Showing the relation between gender and outcomes

In the present study males are more than females i,e; 77.1% and 22.9% respectively. But mortality is more in females ,out of 22 females mortality occurred in 10 females.

**Table 3: Relation between N/L Ratio and Outcomes**

N/L Ratio	Death 34 (35.4%)	Discharge 62 (64.6%)	Total 96 (100.0%)
≤3.5	04 (10.3%)	35 (89.7%)	39 (40.6%)
>3.5	30 (52.6%)	27 (47.4%)	57 (59.4%)



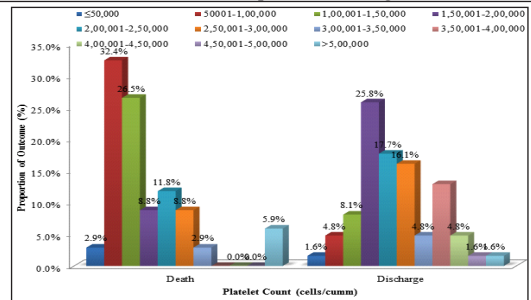
**Graph3:** Showing the relation between N/L Ratio and outcomes

In the present study majority of the patients have NLN ratio >3.5(59.4).death have occurred more in patients with >3.5 NLN ratio i,e; 52% in patients with NLN ratio >3.5.

**Table 4: Relation between platelet count and outcomes**

Platelet Count (cells/mm <sup>3</sup> )	Death 34 (35.4%)	Discharge 62 (64.6%)	Total
≤50,000	01 (02.9%)	01 (01.6%)	02 (02.1%)
50001-1,00,000	11 (32.4%)	03 (04.8%)	14 (14.6%)
1,00,001-1,50,000	09 (26.5%)	05 (08.1%)	14 (14.6%)
1,50,001-2,00,000	03 (08.8%)	16 (25.8%)	19 (19.8%)
2,00,001-2,50,000	04 (11.8%)	11 (17.7%)	15 (15.6%)
2,50,001-3,00,000	03 (08.8%)	10 (16.1%)	13 (13.5%)
3,00,001-3,50,000	01 (02.9%)	03 (04.8%)	04 (04.2%)
3,50,001-4,00,000	00 (00.0%)	08 (12.9%)	08 (08.3%)
4,00,001-4,50,000	00 (00.0%)	03 (04.8%)	03 (03.1%)
4,50,001-5,00,000	00 (00.0%)	01 (01.6%)	01 (01.0%)
>5,00,000	02 (05.9%)	01 (01.6%)	03 (03.1%)

Fisher's Exact Test, p = 0.000, Significant



**Graph 4:** Showing the relation between platelet count and outcomes

In the present study most of the patients have platelets between 1.5lakh to 2 lakh. But the mortality is more in between 50,000-1,00,000 platelet i,e; 32.4%.

**DISCUSSION:**

In our study, age group of 5th decade(51-60year) are more compared to other decades with a male preponderance. In the present study majority of the patients have NLN ratio >3.5(59.4).death have occurred more in patients with >3.5 NLN ratio i,e; 52% in patients with NLN ratio >3.5. In the present study most of the patients have platelets between 1.5lakh to 2 lakh. But the mortality is more in between 50,000-1,00,000 platelet i,e; 32.4%. An outcome of death was associated with thrombocytopenia, increased neutrophil to lymphocyte ratio.

The incidence of thrombocytopenia on admission was lower in patients with COVID-19 but it increased with disease severity. Furthermore, platelet count decreased in patients with progressively severe illness. Decreased platelet count, reflecting their consumption and thrombin generation, is

helpful in recognising the presence and severity of coagulopathy. Thrombocytopenia is common in viral infections, which might be explained by immunological platelet destruction, inappropriate platelet activation and consumption, and impaired megakaryopoiesis<sup>14</sup>. However, whether mechanisms of thrombocytopenia differ between SARS-CoV-2 and other coronaviruses remains unknown.

#### CONCLUSION:

The study of haematological parameters mainly thrombocytopenia and NLN ratio helps in assessing the severity of disease and the outcome. An early diagnosis and recognition of severe COVID-19 infection with these parameters helps in preventing future mortality and helps in the proper management of the disease.

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