



A STUDY OF CBC PARAMETERS IN HOSPITALISED COVID 19 PATIENTS: A STUDY FROM NORTH EAST INDIA

Pathology

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ABSTRACT

Introduction: Although COVID 19 is primarily a disease of the respiratory system, several haematological parameters have been described in infected patients. We conducted this study on 969 patients with symptomatic COVID 19 disease admitted at a tertiary care centre of North east India with the aim of describing the Complete Blood Count changes in these patients in our part of the country. **Materials and Methods:** A retrospective descriptive study was conducted on 969 patients with COVID 19 infection detected either on Rapid Antigen test or RT-PCR who were admitted with symptomatic disease. The records of those patients were studied and the Complete Blood Count and Differential Counts were noted and results analysed. **Results:** The mean total count of the patients was 8454.12/mm³. 53 patients (5.5%) presented with leucopenia while leucocytosis with total WBC count more than 11000/mm³ was seen in 201 cases (20.7%). Neutropenia was observed in 1.4% of the patients. Neutrophilia was seen in 27.8% of patients. Lymphopenia was seen in 32.5% cases while lymphocytosis was seen in 1.5% cases. 55.5% had an Neutrophil to lymphocyte ratio (NLR) of greater than or equal to 3.13. The average platelet count was 1.92 lakhs/mm³. Thrombocytopenia was observed in 36.5 % of the cases which was mild in 34 % cases, moderate in 2% cases and 0.5% cases presented with severe thrombocytopenia. **Conclusion:** In our study, leucocytosis was commoner than leucopenia with 27.8% of the cases showing neutrophilia. Lymphopenia was seen in 32.5% cases. 55.5% had an Neutrophil to lymphocyte ratio (NLR) of greater than or equal to 3.13. Thrombocytopenia was also commonly noted.

KEYWORDS

complete blood count, Covid 19, neutrophil lymphocyte ratio

INTRODUCTION:

An increasing number of unexplained pneumonia cases emerged in Wuhan, China [1], rapidly spreading to and infecting other countries across the world. The pathogenic agent was identified as a novel coronavirus, named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which was responsible for the Corona Virus Disease 2019 (COVID-19). [2] On January 30th, 2020, the WHO declared COVID-19 a Public Health Emergency of International Concern. [3] The first case in India was reported on January 30th, 2020 in the state of Kerala.

Although COVID 19 is primarily a disease of the respiratory system, several haematological parameters have been described in infected patients. The most prevalent haematological findings observed in these patients in a complete blood count (CBC) included lymphopenia, thrombocytopenia, leukocytopenia, and neutrophilia along with elevations in erythrocyte sedimentation rate (ESR), serum ferritin, C-reactive protein (CRP), and procalcitonin. [3] [4]

Coagulopathic features have been observed to be associated with more severe outcome in COVID-19 infection. [5] Coagulation abnormalities, such as increased prothrombin time (PT) and activated partial thromboplastin time (aPTT), elevated fibrinogen, fibrin degradation products (FDP), and D-dimer levels are important prognostic factors in patients suffering from COVID-19 pneumonia. [6] It was found that coronaviruses can infect the marrow cells causing abnormal hematopoiesis [7] which may be responsible for the associated changes in blood counts.

While several studies have been conducted throughout the world on the blood parameters in COVID 19 infection and also in different parts of India, such studies are lacking in the North eastern part of our country with its unique demographic features. Therefore, we conducted this study on 969 patients with symptomatic COVID 19 disease admitted at a tertiary care centre of North east India with the aim of describing the Complete Blood Count changes in these patients in our part of the country.

MATERIALS AND METHODS:

A retrospective descriptive study was conducted on 969 patients with COVID 19 infection detected either on Rapid Antigen test or RT-PCR

who were admitted in different wards of our Medical College with symptomatic disease. The records of those patients were studied and the Complete Blood Count and Differential Counts were noted. Samples were run on Sysmex XN 550 hematology analyser. The data was analysed on Microsoft Excel using descriptive statistics. Since it was a retrospective study on archival data and due to the pandemic, informed consent could not be taken. However, data was deidentified and the study was based on collected data only.

RESULTS:

Out of 969 cases, 746 cases were male and 223 were female giving a male female ratio of 3.3:1. The median age of patients was 38 years. 3.9% (38 patients) were between 0 to 18 years of age, 16.7% (162 cases) fell in the elderly age group and 79.4% (769 cases) were between 18 to 60 years of age. The youngest patient in our study was 9 days old.

The mean total count of the patients was 8454.12/mm³. 53 patients (5.5%) presented with leucopenia while leucocytosis with total WBC count more than 11000/mm³ was seen in 201 cases (20.7%). Neutropenia was observed in 1.4% of the patients. Neutrophilia was seen in 27.8% of patients.

Lymphopenia was seen in 32.5% cases when adjusted for age while lymphocytosis was seen in 1.5% cases.

538 out of 969 cases (55.5%) had an Neutrophil to lymphocyte ratio (NLR) of greater than or equal to 3.13.

The average platelet count was 1.92 lakhs/mm³. Thrombocytopenia was observed in 36.5 % of the cases. Thrombocytopenia was mild (Platelet count >1 lakh/mm³) in 34 % cases, moderate (platelet count between 50,000-1lakh/mm³) in 2% cases and 0.5% cases presented with severe thrombocytopenia.

DISCUSSION:

Although most cases of COVID 19 present with mild to moderate disease, rapid deterioration can occur in severe cases. Severe illness is defined as patients having fever or suspected respiratory infection, plus one of the following: respiratory rate > 30 breaths/min; severe respiratory distress; or pulse oximeter oxygen saturation ≤ 93% on

room air while critical illness is defined as patients with acute respiratory distress syndrome or sepsis with acute organ dysfunction. [8] The guidelines of the National Health Commission of China for COVID-19 5th Edition [9] and the WHO interim Guidance [8] currently recommended two laboratory parameters-normal/decreased numbers of leucocytes or decreased number of lymphocytes as one of the criteria for the diagnosis of COVID-19 infection.

A study of the demographic characteristics revealed increased incidence in males as compared to females with a male:female ratio of 3.3:1. This is similar to studies conducted by Guan WJ et al [3], Zhang JJ et al [10] where the disease was found to be more common in males as compared to females. However some other studies have shown a female preponderance of the disease. [11]

The median age of our patients was 38 years. The bulk of the cases comprised of the adult population between 18 to 60 years of age.

Common hematological tests have an important role in early diagnosis of the disease as they give an idea to physicians regarding the inflammatory process. One of the commonly performed investigation in infections, the complete blood count is relatively inexpensive and parameters like total white blood cell count, neutrophil, lymphocyte and platelet counts, certain ratios of these values can be used as markers of inflammation. Circulating leukocytes respond to stress by increasing neutrophils and reducing lymphocytes; the ratio of these two parameters is also used as an inflammatory marker. [12]

The mean total count in our study was 8454/mm³. Leucocytosis was observed in 20.7% cases while leucopenia was seen in 5.5% of the patients. In the study by Dawood QM et al, leucocytosis (found in 9.82%) and was associated with moderate to severe disease while leucopenia was observed in 5.4% of the patients. [11] Another study on the level of WBCs in hospital admitted patients with COVID-19 showed that leukopenia developed in 20% of patients [13]

32.5% cases in our study showed lymphopenia while lymphocytosis was observed in 1.5% cases. Dawood QM et al in their study found a much lower percentage of lymphopenia (5.4%) [11] but other studies have shown much higher levels of lymphopenia as seen in our study. [14] [15] A low lymphocyte count might be an important indicator for early admission for supportive ICU care as noted in various studies. In a meta-analysis by Zhao et al., [16] lymphopenia was seen to be associated with a threefold increase of severe COVID-19 disease.

Neutrophilia was seen in 27.8% of patients in our study. In a retrospective study by Wu CM et al, 34.5% of patients demonstrated neutrophilia, and patients with ARDS had higher neutrophils than those without ARDS. [4] Thrombocytopenia was observed in 36.5% of our patients. Guan WJ et al [3] in their study found thrombocytopenia in 36.2% of the patients.

Thrombocytopenia is a marker of poor clinical outcome and was associated with a three-fold enhanced risk of worsening disease. The cause of thrombocytopenia is possibly multifactorial in the setting of infection and includes consumptive coagulopathy, ITP, or due to bone marrow response. [17]

The Neutrophil-to-Lymphocyte ratio (NLR) which is a biomarker for the assessment of severity of bacterial infections may also serve as a surrogate marker of early risk identification in COVID 19 patients. 55.5% of our patients had a n NLR of ≥ 3.13 (taking 3.13 as the cut off value). This could be due to the fact that our study was carried out on hospitalised cases and the mild cases were not included in our study.

CONCLUSION:

While the haematological changes in COVID 19 infection are still a matter of debate and discussion, our study gives an idea about the haematological changes of the disease in a population of North east India. Since the study was conducted on hospitalised patients of a tertiary care facility, the changes in mild illness undergoing home isolation and in quarantine facilities could not be evaluated. Nevertheless, it provides a basic insight into the changes in hematology parameters in hospitalised patients in the ethnically distinct north east Indian population.

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