Original Research Article

A Study on CBC (Complete Blood Count) findings with COVID-19 Virus Infection

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Abstract: *Purpose:* To observe the blood picture of patients with COVID 19 infections and to formulate future guidelines for management. *Methods:* This cross-sectional descriptive study was carried out among patients with COVID 19 infections who were admitted to one of the Covid-dedicated hospitals in Bangladesh from March-2020 to May-2020. *Results:* A total of 92 patients were included in this study. 53.3% were male and 46.7% were female. Most of the patient's haemoglobin percentage was found below normal (53.3%), however, the total count of RBC, WBC and Platelet was found within the normal limits in most of the cases (64.1%,80.4% and 87% cases respectively). 75% of patients had high ESR levels. 50% of cases showed Neutrophilia and Lymphocytopenia in 43.5% cases. Although some cases show changes in Monocyte, Eosinophil and Basophil count they were not significant in number. *Conclusions:* A significant number of patient's neutrophilia and lymphocytopenia. Blood parameter is an important tool for managing the COVID-19 patients. With or without co-morbidities maintaining normal blood levels is essential in COVID-19 patient management.

Keywords: Covid-19, blood picture, Neutrophilia, Lymphocytopenia.

INTRODUCTION

The WHO has declared coronavirus disease 2019 (COVID-19) as a public health emergency of international concern [1]. Coronavirus disease 2019 (COVID-19) is a contagious disease of the respiratory system. It is an emerging zoonosis caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). Phylogenetically, SARS-CoV-2 sufficiently differs from other zoonotic coronaviruses, such as Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) and the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) introduced to humans in the past two decades [2].

The outbreak of the COVID-19 due to the SARS-CoV-2 was firstly epi-centred in Hubei province, Wuhan, China. The SARS-CoV-2 is a high transmissible virus that spread across the world within a short period. Therefore, on March 12, 2020, the world health organization (WHO) declared COVID-19 a pandemic for the world. Globally, the

ongoing pandemic has created numerous challenges to the healthcare systems of many countries [3]. As of early December, 2021, there have been 26,55,34,950 confirmed cases in 224 countries/regions and 52,51,175 COVID-related deaths world-wide.

With a population of more than 161 million people, Bangladesh stands eighth among the most populated countries in the world. In Bangladesh, as of 5 December 2021, infections from SARS-CoV-2 had spiked to nearly 15,77,443 individuals and the death count was 28,001 people. With regard to the clinical outcomes of COVID-19 and its association with various path physiological factors, no comprehensive study has been conducted in Bangladesh. Some of the studies did not include a large sample size so understanding the aforementioned relationship of COVID-19 symptoms with comorbidities and biochemical parameters from previous studies was not possible. In particular, the long-term complications or short-term outcomes among patients with COVID-19 have not been studied with the necessary rigour [4].

The ongoing pandemic of coronavirus disease 2019 (COVID-19) poses several challenges to clinicians. Timely diagnosis and hospitalization, risk stratification, effective utilization of intensive care services, selection of appropriate therapies, monitoring and timely discharge are essential to save the maximum number of lives. COVID-19 is not a localized respiratory infection but a multisystem disease caused by a diffuse systemic process involving a complex interplay of the immunological, inflammatory and coagulative cascades.

The understanding of what the virus does to the body and how the body reacts to it has uncovered a gamut of potential biomarkers. Clinical assessment is indispensable, but laboratory markers, or biomarkers, can provide additional, objective information which can significantly impact these components of patient care.

METHODS

This cross-sectional observational study was carried out among the Patients who were admitted in Covid unit of two tertiary level Hospital in Dhaka, Bangladesh from March-2020 to May-2020. We reviewed and analyzed the CBC test report of those patient's which were done routinely during the admission. Severely ill, ICU patient, patient with other co-morbidities was excluded from this study. The study place was Sheikh Fajilatunnesa Mujib Eye Hospital & Training Institute, Gopalgonj, Bangladesh. Variables Age, Gender, Hemoglobin percentage, all blood cells, erythrocyte sedimentation rate were included in this study. The study commenced after an approval from our Institutional Review Board.

RESULTS

A total of 92 patients were included in this study. The mean age was 49.38±1.99 SD. Male was 53.3%, and 46.7% was Female. Anaemia (<Hemoglobin %) was found in a significant percentage (53%) of patients. Erythrocytopenia was found in about 36% of patients, and leukocytosis was observed in 18.5% (**Table-1**). 75% of patients had high ESR (Erythrocyte Sedimentation Rate) levels in the Westergren method (**chart-1**).

Table-1: Shows the Frequency of Hb% and total blood count of the patient

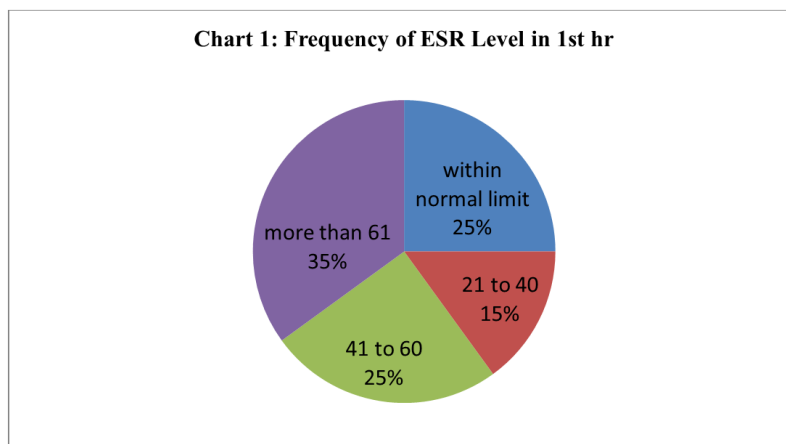| Parameter	Hemoglobin No. %	Total RBC No. %	Total WBC No. %	Total Platelet No. %
normal value	41 (44.6%)	59 (64.1%)	74 (80.4%)	80 (87%)
Above normal value	2 (2.2%)	0 (0%)	17 (18.5%)	1 (1.1%)
Below normal value	49 (53.3%)	33 (35.9%)	1 (1.1%)	11 (12%)
Total	**92 (100%)**	**92 (100%)**	**92 (100%)**	**92 (100%)**

Chart 1

50% of cases showed Neutrophilia and Lymphocytopenia in 43.5% cases. Although some instances show changes in Monocyte, Eosinophil, and Basophil (**Table-2**) count, they were not significant in number. However, the PCV (packed cell volume) was decreased in 51 (55.44%) cases but within the Normal range in 39(42.39%) cases, whereas MCV (mean corpuscular volume) was normal in 58.7% and decreased in 40.22% cases. Although Hb% was found below the standard limit in most of the issues, however, MCH (mean corpuscular haemoglobin) and MCHC (Mean corpuscular haemoglobin concentration) were found within the normal range in most of the patients (71.74% and 68.48%, respectively). Mean platelet volume (MPV) was average in most cases (57.7%), below the normal range in 21.8% and above the normal range in 20.5% cases. Platelet Distribution Width (PDW) was found normal in 50% cases and below average in 48.3% cases.

Table-2: Shows the Frequency of Differential white blood count of the patient

Parameter	Neutrophil No. %	Lymphocyte No. %	Monocyte No. %	Eosinophil No. %	Basophil No. %
Normal value	46 (50%)	44 (47.8%)	81 (88%)	73 (79.3%)	87 (94.6%)
> normal value	46 (50%)	8 (8.7%)	6 (6.5%)	2 (2.2%)	0 (0%)
< normal value	0 (0%)	40 (43.5%)	5 (5.4%)	17 (18.5%)	5 (5.4%)
Total	**92 (100%)**	**92 (100%)**	**92 (100%)**	**92 (100%)**	**92 (100%)**

DISCUSSION

We conducted this observational study to assess the connection of haematological abnormalities with the hospitalized COVID-19 patients. Amidst the increasing rate of COVID-19 transmission, it is vital to generate comprehensive information regarding the COVID-19 infection to measure the mortality risks. Haematological parameters can help to measure COVID-19 severity. Therefore, we can assess patients' severity and mortality risks by easily monitoring those potential indicators.

The current cross-sectional study aimed to explore COVID-19 related complications and body reactions to this infection. Our data clearly illustrates the significant impact of these findings in the management of the covid patients in Bangladesh. A total of 92 patients were included in this study. The mean age was 49.38+_1.99 SD. Male was 53.3% and 46.7% was Female. Most of the patient's haemoglobin percentage was found below normal (53.3%), however, the total count of RBC, WBC and Platelet was found within the normal limits in most of the cases (64.1%,80.4% and 87% cases respectively). Anaemia was associated with 53.3% of patients of SARS-CoV 2 positive. Anaemia is reported in 61% of patients of the SARS-CoV 2 positive patients [5]. 75% of patients had high ESR levels. The raised ESR is not yet clear. The high level of ESR may have a negative impact on COVID-19 patients' prognosis [6]. We found Neutrophilia in 50% of cases and the rest of the 50% was normal value. Patients with Neutropenia were not found in this study. Neutropenia may occur in viral diseases, due to bone marrow suppression [7]. Neutrophilia is associated with viral respiratory diseases [8-10], and leukocytosis with neutrophilia is associated with severe diseases rather than mild to moderate diseases [11]. The most recognized haematological abnormality in patients with COVID-19 infection is lymphopenia, which is reported in up to 85% of severe cases of COVID-19 illness [12]. In this study, Lymphocytopenia was found in 43.5% of cases which were consistent with the findings of Lanini *et al.,* [13] and Mardani R *et al.,* [14]. Lymphocytosis was only noted in 8.7% of the patients of Covid 19 in this study. Lymphocytosis occurs most commonly after other viral infections and is rarely observed in bacterial infections [15]. Although some cases show changes in Monocyte, Eosinophil and Basophil count they were not significant in number. However, the PCV (packed cell volume) was decreased in 51 (55.44%) cases but within the normal range in 39 (42.39%) cases, whereas MCV (mean corpuscular volume) was normal in 58.7% and decreased in 40.22% cases. Although Hb% was found below the normal limit in most of the cases, however, MCH (mean corpuscular haemoglobin) and MCHC (Mean corpuscular haemoglobin concentration) were found within the normal range in most of the cases (71.74% and 68.48% respectively). Total platelet count was reported as normal in 87% of the patients and thrombocytopenia was noted in 12% of the patients. Mean platelet volume (MPV) was normal in most of the cases (57.7%), below the normal range in 21.8% and above the normal range in 20.5% cases. Platelet (PLT) count is an important parameter that evaluates the disease severity included in numerous various types of viral infections. In COVID-19 infection, the presence of thrombocytopenia indicates the presence of consumption coagulopathy, higher mortality and severe COVID-19 illness [16-18]. Thrombocytopenia is the hallmark of severe dengue virus infection [19]. In a study, a low platelet count was counted in 18% of chikungunya virus infections, whereas 74% in dengue virus infection [20]. Platelet Distribution Width (PDW) was found normal in 50% cases and below normal in 48.3% cases. Similar data were found by Rahman MA *et al.,* [2].

The strengths of our study were the consistency of the findings with various other international studies and our limitation was the small sample size.

CONCLUSIONS

Anaemia, Neutrophilia, Lymphocytopenia may be associated with SARS-CoV 2 infections. Based on our results, Complete blood Count levels at admission to hospitals represent simple assessment factors for COVID-19 severity and the treatment decisions at the hospital setup. These blood parameters could serve as indicators for the prognosis and severity of COVID-19. Therefore, our study findings might help to develop a treatment protocol for COVID-19 patients at the hospital setup.

Author's Contributions

All the authors were contributed in various parts of the publication from concept and design, acquisition of data, analysis & interpretation of data and drafting of the manuscript.

DECLARATION OF CONFLICTS

The authors declare that, there is no conflict of interest regarding the publication of this article.

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