Original Research Article

Complete Blood Count (CBC) in COVID-19 Patients attending at Bangladesh Institute of Health Sciences (BIHS) General Hospital, Dhaka

ABSTRACT

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) is the infectious agent that causes Coronavirus Disease 2019 (COVID-19), a contagious illness. The epidemic has continued since it was first discovered in Wuhan, Hubei, China, in December 2019. The WHO estimated that 800 million people worldwide (or one in ten) may have COVID-19 infection on October 5. More than 1.07 million fatalities and 37 million cases have been documented as of October 11, 2020, spanning 188 nations and territories; more than 25.7 million patients have recovered. Fever, coughing, exhaustion, shortness of breath or other breathing issues, and a loss of taste and smell are typical symptoms.Acute respiratory distress syndrome (ARDS), which can be brought on by cytokine storm, multi-organ failure, septic shock, and blood clots, can affect some people while the majority only have moderate symptoms. One to fourteen days may pass during the incubation period. The aim of this study was to observe the Complete blood count in COVID-19 & Non COVID-19 Patients in Bangladesh. A descriptive cross-sectional study was conducted for the study. Data were collected from Bangladesh Institute of Health Sciences (BIHS) General Hospital and Hematology Department of Bangladesh University of Health Sciences (BUHS). A pretested semi-structured questionnaire was used for the data collection. The standard method of diagnosis is by real-time reverse transcription polymerase chain reaction (RT-PCR) from a nasopharyngeal swab. The results showed that, among 100 patients, 50% patient was Covid-19 positive &50% patient was negative. In comparison between Covid-19 positive & negative CBC result showing that Hb% remain almost same, total count is slightly increased in covid-19 positive patient than non-covid-19.RBC are found in Normal range for both positive and negative patients. Platelet count & PCV are lower in Covid-19 positive patient than negative patient.Neutrophil are significantly raised in Covid-19 positive patient. Lymphocytes are significantly decreased in Covid-19 positive patient than negative. In this study males are affected 64% & females are 36% so the ratio between male& female is 3:2. More positive

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patients were found in the age between 50-70 years&has risk among 40-80 years. According to this study, it can be concluded that there is an association among neutrophil, lymphocyte and other cell status in clinically in COVID-19 & Non COVID-19 Patients.

Keywords: Covid-19, CBC, RNA Virus, SARS-CoV-2

1. INTRODUCTION

Coronavirus disease (COVID-19) is an infectious disease caused by the SARS-CoV-2 virus.Most people infected with the virus ~~will~~experience mild to moderate respiratory illness and recover without requiring special treatment. However, some will become seriously ill and require medical attention. Older people and those with underlying medical conditions like cardiovascular disease, diabetes, chronic respiratory disease, or cancer are more likely to develop serious illness. Anyone can get sick with COVID-19 and become seriously ill or die at any age[1]. The best way to prevent and slow down transmission is to be well informed about the disease and how the virus spreads. Protect yourself and others from infection by staying at least 1 meter apart from others, wearing a properly fitted mask, and washing your hands or using an alcohol-based rub frequently. Get vaccinated when it's your turn and follow local guidance[2].The virus can spread from an infected person's mouth or nose in small liquid particles when they cough, sneeze, speak, sing or breathe. These particles range from larger respiratory droplets to smaller aerosols. It is important to practice respiratory etiquette, for example by coughing into a flexed elbow, and to stay home and self-isolate until you recover if you feel unwell[3].

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The COVID-19 caused by the corona virus is a potential threat to every individual, especially to the immune-compromised patients. This study will determine the variation of Complete blood count of the patients infected with corona virus. The result will also help to check for infection, injury and other conditions in the patients.

COVID-19 pandemic in Bangladesh

The COVID-19 pandemic in Bangladesh is part of the worldwide pandemic of coronavirus disease 2019 (COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-

CoV-2). The virus was confirmed to have spread to Bangladesh in March 2020[4]. The first three known cases were reported on 8 March 2020 by the country's epidemiology institute, IEDCR. Since then, the pandemic has spread day by day over the whole nation and the number of affected people has been increasing. Bangladesh is the second most affected country in South Asia, after India.[4]In order to protect the population, the government declared "lockdown" throughout the nation from 23 March to 30 May and prepared some necessary steps to spread awareness to keep this syndrome away from them[5]. Infections remained low until the end of March but saw a steep rise in April.In the week ending on 11 April, new cases in Bangladesh grew by 1,155 percent, the highest in Asia, ahead of Indonesia, with 186 percent. On 6 May, cases were confirmed in all districts. Rangamati was the last district to report confirmed cases of COVID-19. On 13 June, the number of cases in Bangladesh exceeded the number of cases in China, the country where the outbreak began. Bangladesh reached two grim milestones of 160,000 cases and 2,000 deaths on 5 July and overtook France in terms of the number of cases two days later. The number of recoveries in the country exceeded the number of active cases on 12 July[6].

Medical experts feared that not enough tests were being conducted. Newspaper reports and social media continued to report about additional deaths of patients with COVID-19 symptoms. Some of the deceased were treated at COVID-19 isolation centers at hospitals in the districts and others were denied treatment, though no tests were conducted to confirm contagion. For a long time, testing was centralized to only Institute of Epidemiology, Disease Control and Research (IEDCR) in the capital Dhaka, although patients with symptoms were reported all around the country[6]. On 22 March, Bangladesh declared a 10-day shutdown effective from 26 March to 4 April. This was later extended to 30 May.Besides, Medical-grade Oxygen has been a concern to look at as the present demand for Oxygen in Bangladesh is around 200 tons in a day for medical treatment purposes[7], which has a significant possibility to elevate at an exponential itrate every day, hence, to meet up the potential needs, Bangladesh is required to ready itself, by establishing a demand forecasting model for Medical-grade Oxygen at the earliest with the coordinated efforts of Department of Public Health Engineering (DPHE); and Institute of Epidemiology, Disease Control and Research (IEDCR)[6,8].

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Pathogenesis of Corona virus

The main pathogenesis of COVID-19 infection as a respiratory system targeting virus was severe pneumonia, RNAaemia, combined with the incidence of ground-glass opacities, and acute cardiac injury[9]. Significantly high blood levels of cytokines and chemokines were noted in patients with COVID-19 infection that included IL1-β, IL1RA, IL7, IL8, IL9, IL10, basic FGF2, GCSF, GMCSF, IFNγ, IP10, MCP1, MIP1α, MIP1β, PDGFB, TNFα, and VEGFA. Some of the severe cases that were admitted to the intensive care unit showed high levels of pro-inflammatory cytokines including IL2, IL7, IL10, GCSF, IP10, MCP1, MIP1α, and TNFα that are reasoned to promote disease severity[10,11].

2. METHODOLOGY

It was a cross sectional study. It was a descriptive research that was mainly based on observation.The study was conducted in Bangladesh Institute of Health Sciences (BIHS) General Hospital and Hematology Laboratory Department of Bangladesh University of Health Sciences (BUHS).100 patients between the age 31 and 80, were approached to participate for the research. Sampling technique was purposive sampling.All data were collected between the periods of 15th September, 2020 to 12th November, 2020.

Inclusion criteria

Clinically suspected patients with Covid–19 positive by RT-PCR method and associated tests Hb%,RBC,TC, Neutrophil, Lymphocyte, platelet, PCVcount were included in the study according to the socio demographic status.

Exclusion criteria

- Patients up to 30years,
- Pregnant women,
- Surgical patients,
- ICU patients, were excluded.

Laboratory Tests

In the laboratory, 2ml blood were needed for CBC. The test was evaluated using a centrifuge, which cause the contents of blood to separate. Anticoagulant was added to keep blood from clotting. When the test tube was taken out of the centrifuge, it was settled into three parts:

- Red blood cells
- Anticoagulant
- Plasma, or the fluid

Each component was settled in a different part of the tube, with the red blood cells moving to the bottom of the tube. CBC were analyzed by automated hematology analyzer- Sysmex 1800i, for analysis.

Statistical Analysis

Statistical analysis was done on an MS Windows-based PC computer. The data were first keyed into a Microsoft Excel spreadsheet and then analyzed by Statistical Package for the Social Sciences (SPSS).

3. RESULTS

Among 100 patients, 50% patient was Covid-19 positive & 50% patient was negative.According to total sample pie chart are given below.

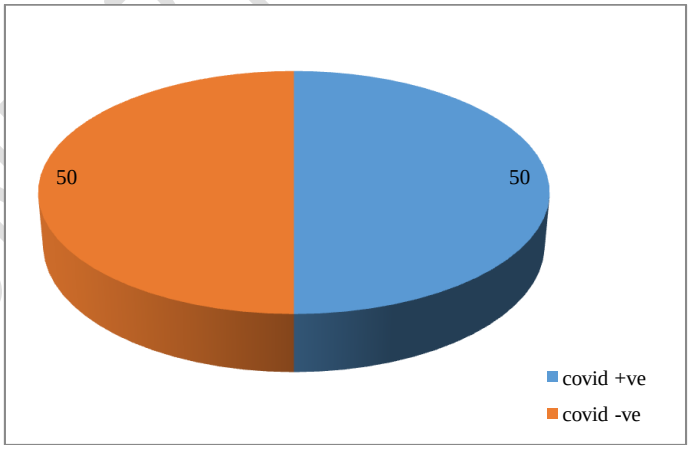

Figure 1: Estimation of Covid-19 positive&negative patients

Table 1: Mean value of CBC among Covid-19 positive & negative patients

Variable	Covid-19 Positive	Covide-19 Negative
Hb%	10.08 g/dl	12.86 g/dl
Total count	16.3x10^9/L	11x10^9/L
RBC	4.2x10^12/L	4.9x10^12/L
Platelet	177.5x10^9/L	292.6x10^9/L
Neutrophil	88%	63%
Lymphocyte	13%	29%
PCV	0.27 %	0.40%

~~From table 1 we showed that the Covid 19 positive patients CBC mean was Hb% 10.08 g/dl, total count 16.3x10^9/L, RBC 4.2x10^12/L, platelet 177.5x10^9/L, neutrophil 88 %, lymphocyte 13% and PCV 0.27%. Covid 19 negative patients CBC mean was Hb% 12.86 g/dl, total count 11x10^9/L, RBC 4.9x10^12/L, platelet 292.6x10^9/L, neutrophil 63 %, lymphocyte 29% and PCV 0.40%.~~

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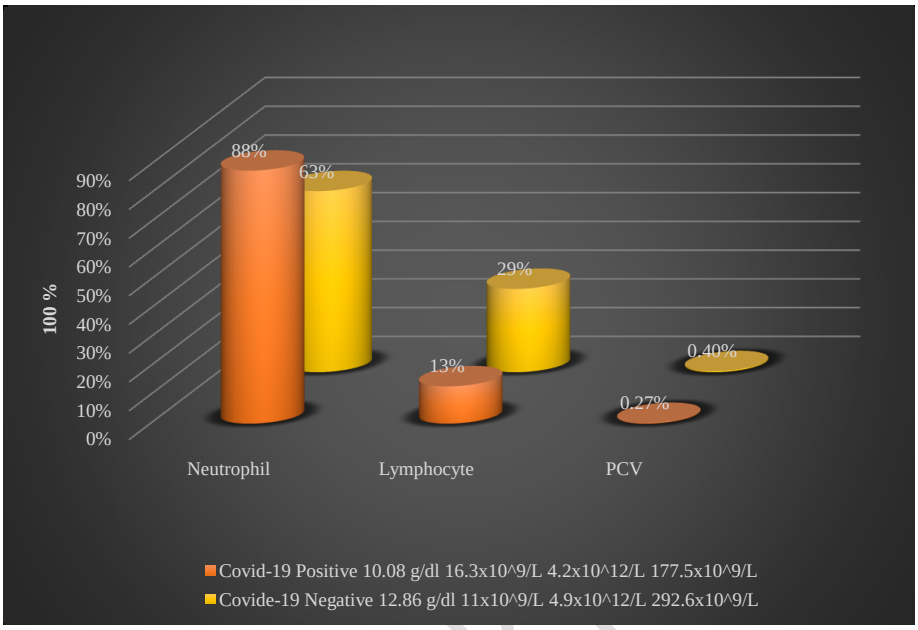

Figure 2: Comparison of CBC between Covid-19 Positive and Covid-19 negative patients

Among 100 patients 50 % was Covid-19 positive and 50 % was Covid-19 negative. In comparison between Covid-19 positive & negative CBC result showing that Hb% remain almost same. Total count was slightly increased in covid-19 patient than non covid-19. RBC are found in Normal range for both positive and negative patients. Platelet count & PCV are lower in Covid-19 positive patient than negative patient. Neutrophil are significantly raised in Covid-19 positive patient. Lymphocytes are significantly decreased in Covid-19 positive patient than negative

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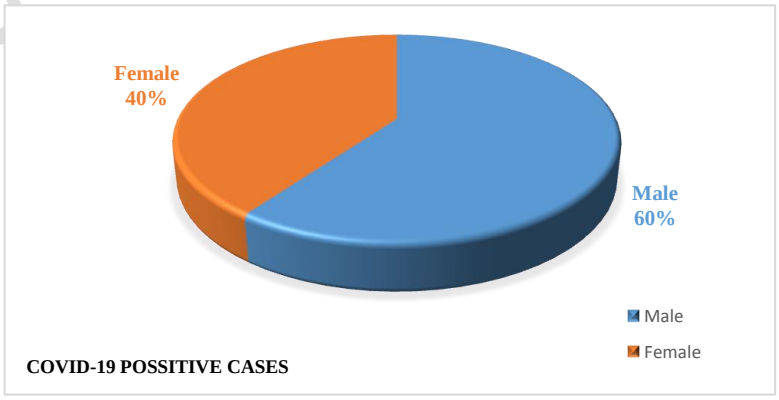

Figure 3: Covid-19 positive percentage between Male & Female

This figure shows that male is more affected than female. In this studymales are affected 64% & females are 36% so the ratio between male& female is 3:2(app).

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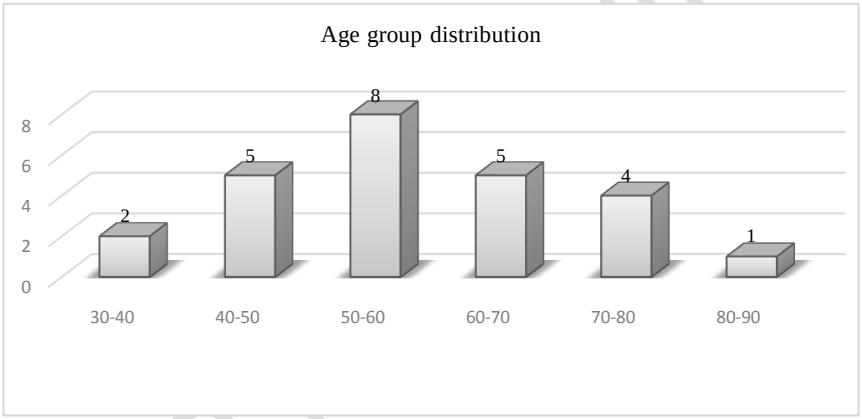

Figure 4: Age group distribution of Covid-19 positive and negative patients

In this study was taken sample among 31-80 years 'patient. This graphical presentation represents more positive patients were found in the age between 51-70 years& has risk among 41-80 years.

4. DISCUSSION

The study was done to estimate the different cell status in 100 clinically suspected Covid-19 patients in which 25 patients were Covid-19 positive & 75 patients were Covid-19 negative. Among them were 40% female patients and 60%male patients. Observations were made in several categories.Patients who were Covid-19 positive had abnormal TC, neutrophil,

lymphocyte &Platelet count whereas patients with Covid-19 negative have normal value.Hb% remain almost same, total count is slightly increased in Covid-19 patient than non-Covid-19.RBC are found in Normal range for both positive and negative patient. Platelet count & PCV are lower in Covid-19 positive patient than negative patient.Neutrophil are significantly raised in Covid-19 positive patient. According to the data from Jin Yin-tan Hospital, the median absolute neutrophil count (ANC) in Covid-19 positive cases was much higher than non-Covid-19 cases[12]. Similar results were found in the study from Beijing Ditan Hospital; the median neutrophil count of common, while the median neutrophil was higher in severe or critical type. Lymphocytes were significantly decreased in Covid-19 positive patient than negative.Lymphopenia generally occurs with leukopenia after coronavirus infection, even white blood cell count remains in normal range[14].

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Male is more affected than female in Covid-19.In this studymale were affected 60% & females were 40% so the ratio between male& female was 2:3.According to age distribution chart, it was found that the age between 50-60 years old people were more affected than others in this study.Moreover, there were many limitations. In this case some Data or information may be slightly different from this study. From figure 2, Among 100 patients 50 % was Covid-19 positive and 50 % was Covid-19 negative. In comparison between Covid-19 positive & negative CBC result showing that Hb% remain almost same. Total count was slightly increased in covid-19 patient than non covid-19. RBC are found in Normal range for both positive and negative patients. Platelet count & PCV are lower in Covid-19 positive patient than negative patient. Neutrophil are significantly raised in Covid-19 positive patient. Lymphocytes are significantly decreased in Covid-19 positive patient than negative.

One study they found that Hb concentration, RBC count, HCT, MCH, and MCHC median values were all significantly decreased in COVID-19 subjects compared with controls[14]. This finding agrees with Yuan and coworkers[15], who found that severe and critically ill patients had significantly decreased RBC and Hb and with another study reporting a rapid decline of Hb and RBC among COVID-19 patients[16]. Additionally, a study by Mei et al.[17] found that the red blood cell parameters (RBC, Hb, and HCT) were significantly reduced in patients where COVID-19 was severe. The exact mechanism of how COVID-19 causes anemia is not fully understood but

suggested to be via inhibition of erythropoiesis in the bone marrow. On the contrary, Usul et al.[14] stated that Hb levels in COVID-19-positive patients were found to be significantly higher than those in COVID-19-negative patients. This discrepancy from our results could be attributed to differences in study population characteristics such as the presence of underlying chronic diseases and cigarette smoking, which could directly affect the RBC profile. Those factors were not the exclusion criteria as mentioned by the authors[14,18]. Fan and his colleagues[19] revealed that on admission to the hospital, most COVID-19 patients had a normal CBC (normal Hb, WBC, and platelet count). Another study, the median values of RDW show a statistically significant increase among COVID-19 subjects against the control group. This finding is consistent with that of Lee and coworkers[20] that nearly half (49.7%) of the patients hospitalized for COVID-19 were found to have elevated RDW values at presentation and with Wang et al., who found that the morphological parameters (RDW-CV and RDW-SD) were significantly higher in the severe COVID19 group[21].

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5. CONCLUSION

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. Coronaviruses are enveloped non-segmented positive-sense ribonucleic acid (RNA) viruses that are broadly distributed in humans and other natural hosts.In this study it is concluded that Platelet count & PCV are lower in Covid-19 positive patient than negative patient.Neutrophil are significantly raised in Covid-19 positive patient. Lymphocytes aresignificantly decreased in Covid-19 positive patient than negative. Male are more affected than female. Older age has higher risk than younger.

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Ethical consideration

The patients' anonymity was maintained as only the unique hospital identification number of the patient was recorded for the purpose of study along with age and sex. This study was approved by the ethical committee of Bangladesh Institute of Health Science and Bangladesh University of Health science.

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Comment [DT15]: Follow Journal's guidelines??

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