

Original research article

## Complete Blood Counts in COVID-19 patients at JIIU's Indian Institute of Medical Science and Research, Jalna, Maharashtra.

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### Abstract

**Background:** The new 2019 coronavirus disease (COVID-19), according to the World Health Organization (WHO), has been characterized as a pandemic. As more is being discovered about this virus, we aim to report findings of the complete blood count (CBC) of COVID-19 patients. **Methods:** A total of 100 patients were admitted at the Noor Hospital of JIIU's IIMSR, Jalna. The CBCs of these patients, following a confirmed diagnosis of COVID-19, were analyzed and a significant  $P < 0.05$  was found after a full statistical analysis.

**Results:** CBC analysis revealed changes in the levels of red blood cells (RBCs), hemoglobin (HGB), hematocrit (HCT), mean corpuscular volume (MCV), and C-reactive protein (CRP).

**Conclusion:** Clinicians should expect similar findings when dealing with the new COVID-19. This would serve in providing physicians with important knowledge on the changes that can be expected from the CBC of COVID-19 patients.

**Key Words:** Covid 19, Complete Blood Count

### Introduction

The World Health Organization (WHO) has characterized the novel coronavirus outbreak as a pandemic. It was first reported in Wuhan, China and has now rapidly spread worldwide [1,2,3]. The 2019 coronavirus disease (COVID-19) is more contagious than severe acute respiratory syndrome coronavirus (SARS-CoV) and the Middle East respiratory syndrome coronavirus (MERS-CoV) though they share similar epidemiological characteristics. But COVID-19 has been found to have lower mortality rate (2.08%) as compared with SARS-CoV (10.87%) and MERS-CoV (34.77%) [4]. However, all these diseases manifest with cough and fever, regardless of their differences [5,6].

Laboratory findings play an essential role in determining treatment modalities while dealing with COVID-19. Even routine complete blood counts (CBCs) are very helpful. Thus, study of CBC findings in patients with COVID-19 infection will provide useful information to all physicians. This study was conducted with an aim of investigating the significant changes observed in the CBC of COVID-19 patients.

### Materials and Methods

This was a cross sectional observational study conducted in a JIU's IIMSR, a tertiary care centre in Jalna district of Maharashtra. Institutional Ethical committee approval was obtained and data were collected from April to June 2021. All patients who were confirmed as positive for COVID-19 based on a history of exposure to the virus, clinical manifestations, lungs computed tomography (CT scan), and pharyngeal swab specimen's nucleic acid amplification test by reverse transcription-polymerase chain reaction (RT-PCR) according to the tentative sixth edition of diagnosis and treatment plan for corona virus disease[7], were included in the study. Informed consent was obtained from all patients involved in the present study. CBC parameters and CRP values were obtained from the patients records. The first whole CBCs of confirmed COVID-19 patients were analyzed. Statistical analysis was assessed by the Microsoft Excel. The normal distribution measurement was expressed by mean  $\pm$  standard deviation. We considered  $P < 0.05$  was considered significant.

### Results

Data of 100 confirmed cases of COVID-19 was analyzed which consisted of 72% males and 28% females. The median age of subjects used in the present study was 45 years. Co-morbidity was present in 74% patients. Table 1 shows laboratory findings including mean values of total white blood cells (WBCs) count, red blood cells (RBCs) count, hemoglobin (HGB), platelets (PLTs) count, absolute counts of neutrophils, lymphocytes, monocytes, eosinophils, basophils. It also includes hematocrit (HCT), mean corpuscular volume (MCV), mean corpuscular HGB (MCH), MCH concentration (MCHC), platelet distribution width (PDW), and C-reactive protein (CRP) counts.

In our study we found that the mean values of WBC, RBC, HGB and HCT of COVID-19 patients were towards lower limits of normal range and CRP levels were significantly increased.

In present study, we also found a statistical difference between co-morbid groups for these laboratory parameters: RBC ( $P=0.001$ ), HGB ( $P=0.004$ ), HCT ( $P=0.01$ ), MCV ( $P=0.01$ ), and CRP ( $P=0.027$ ). There was no statistically significant difference in CRP levels ( $P=0.155$ ) among male and female COVID-19 patients. But, statistical significant difference was seen in RBC, HGB, neutrophils, monocytes, HCT, MCV, MCH, MCHC, and PDW levels between gender groups.

**Table 1: CBC results of all patients**

Laboratory parameters	Normal ranges	Mean	Std. deviation
WBC ( $\times 10^9/l$ )	3.5–9.5	5.52	2.13
RBC ( $\times 10^{12}/l$ )	4.3–5.8	4.48	0.76
HGB (g/dl)	13.0–17.5	13.9	1.65
PLTs (%)	125–350	178.92	82.92
Neutrophils ( $\times 10^9/l$ )	1.8–6.3	3.98	2.12

<b>Lymphocytes</b> ( $\times 10^9/l$ )	1.1–3.2	1.36	0.73
<b>Monocytes</b> ( $\times 10^9/l$ )	0.1–0.6	0.5	1.52
<b>Eosinophils</b> ( $\times 10^9/l$ )	0.02–0.52	0.09	0.118
<b>Basophils</b> ( $\times 10^9/l$ )	0–0.06	0.04	0.02
<b>HCT (%)</b>	40–50	41.39	2.82
<b>MCV (fl)</b>	82–100	95.10	4.18
<b>MCH (pg)</b>	27–34	30.99	2.39
<b>MCHC (g/l)</b>	31.6–35.4	33.62	3.78
<b>PDW (%)</b>	10.0–17.9	15.23	1.56
<b>CRP (mg/l)</b>	3.0–10.0	24.04	42.39

### Discussion

In present study, 100 COVID-19 patients were included consisting of 72 males and 28 females. The median age of our study population was 45.0 years. In Several similar studies, an older median age of 50–57 years was reported in COVID-19 patients [1,5,8,9].

Our study showed high levels of CRP (mean-24.04  $\pm$  42.39) . This finding correlates with study done by Dodji Kossi Djakpo [1]. The inflammatory response of human body to the new COVID-19 infection explains the rise of C-reactive protein levels.

Other CBC parameters in our study, such as WBC, RBC, HGB and HCT show mean values towards lower limits of normal. Study done by **Abozer Y. Elderderly et al documents significantly lower values of RBC, HGB, HCT, MCH and MCHC in covid -19 patients as compared to non-COVID control group.[10]**

In patients with co-morbid conditions, some CBC parameters were found to be significantly lower like HGB (10.48  $\pm$  1.48 gm/dl] and reduced HCT (33.35  $\pm$  4.85) and lower RBC (3.17  $\pm$  0.56). However, CRP levels were found to be significantly higher in patients with comorbidities. Similar findings were also noted by Dodji Kossi Djakpo [1] in their study. The presence of comorbid conditions of in COVID-19 patients might interfere with RBC production due to existing inflammation. Thus, abnormalities of HGB, HCT, and RBC or anemia observed in patients with comorbidities are explained by the inability of the bone marrow to produce enough RBCs to carry oxygen and due to lung damages induced by the COVID-19, which makes gaseous exchange difficult and hence adding to the severity of infection[1,10] .

In our study, there was no leukocytosis even in patients with co-morbidities, but the mean WBC was towards lower limits of normal. Study done by Zhang reported significantly increased leukocytes (P=0.003) in severe cases of COVID-19 [5].

In our study, high CRP levels in patients with comorbidities were inferior to that found by Dodji Kossi Djakpo [1] and Zhang [5]. It is also well documented that the CRP levels rise during infections [11], and as part of inflammatory processes [12].

However, in our study CRP levels among male and female patients with co-morbidities were not statistically different; thus, suggesting level of inflammation is not related with gender. However, there was a statistically significant difference in values of RBC, HGB, neutrophils, monocytes, HCT, MCV, MCH, MCHC, and PDW levels between gender groups. Most of the

RBC parameters being already lower in females than males are more severely affected due to infections as compared to males.

We found no lymphopenia or neutrophilia in our study, though mean absolute lymphocyte count and WBC count was lower. Many similar studies reported lymphocytopenia.[13,14] one study reported persistent lymphocytopenia and neutrophilia until death [15]. Li reported in one-single arm meta-analysis of 1994 patients a blood count finding of increased CRP (44.3%), leukocytopenia (29.4%), and lymphocytopenia (64.5%) [16]. Qin in his laboratory data analysis of 452 patients showed patients with higher leukocytes count and lower percentages of monocytes, basophils, and eosinophils, as well as lymphocytopenia in the more severe cases [17]. Mean Absolute counts of neutrophils, eosinophils, monocytes and basophils were not affected in our study.

### Conclusion

The present study shows laboratory analysis of CBC of 100 COVID-19 cases presenting in a tertiary care centre in rural area of Maharashtra. Many of the CBC parameters in our study show changes as already documented in literature with RBC parameters showing major effect by Covid -19 infection and associated co-morbidities. However, some parameters show no changes in our study. Thus, there may be variable CBC changes in COVID-19 infection which may be related to varied severity, and clinical presentations of this infection. CBC parameters play an important role in deciding management protocols and prognosis in COVID-19 infection and hence, should be considered an important investigation.

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