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STUDY OF HEMATOLOGICAL PARAMETERS IN PATIENTS WITH CORONAVIRUS DISEASE IN BAPUJI HOSPITAL(JJMMC), DAVANGERE

Pathology

Dr Akash Kumar Dutta Junior Resident, Department Of Pathology, Jjm Medical College, Davangere , India,

Dr Vishalaxi H Patil Junior Resident, Department Of Pathology, Jjm Medical College, Davangere , India

Dr Sunetra Mandal Junior Resident, Department Of Pathology, Jjm Medical College, Davangere , India

Dr Ashwini Hn Professor, Department Of Pathology, Jjm Medical College, Davangere , India

Dr Tennetipayani Susmitha Sri* Junior Resident, Department Of Pathology, Jjm Medical College, Davangere , India *Corresponding Author

ABSTRACT

Coronavirus disease 2019 (COVID-19) is a novel infectious disease that is caused by SARS-CoV-2, a newly emergent coronavirus was first recognized in Wuhan, China in December 2019. Genetic sequencing of the virus suggests that it is a beta corona virus closely linked to the SARS virus. COVID-19 disease associated with hematological parameter changes in complete blood picture and coagulation studies. Numerous observational studies have suggested that the neutrophil-to-lymphocyte ratio (NLR) and lymphocyte proportion and the platelet-to-lymphocyte ratio (PLR) are inflammatory markers. **Objectives:** The aim was to study the changes in hematological parameters in relation to the severity of the disease with respect to Neutrophil/Lymphocyte , Platelet/Lymphocyte ratio in COVID-19 patients. **Patients and Methods:** This was a retrospective cross-sectional study conducted in the wards of covid19 patients at Bapuji hospital for a period of 1 month (march2021-april 2021) Complete blood count was ordered for all patients at the time of admission along with confirmation of the disease by reverse Transcription-polymerase chain reaction (RTPCR). **Results:** The study population consisted of 100 patients. Males were predominantly affected .The age group of patients ranged from 15-85 years with the mean age of 50 years. In this study Hb % & Rbc parameters of these patients were under normal limits. Leucocytosis was found in 31 % of cases, Neutrophilia in 94% of cases, increased ANC in 58% of cases, Lymphopenia in 78% of cases, decreased ALC in 62% of cases, thrombocytopenia in 18% of cases & increased PLR in 67 % of cases , increased NLR in 64% of cases. The derived NLR and PLR ratios were found to be significantly associated with decreased mortality in this study

KEYWORDS

Coronavirus disease 2019, hematological parameters, leukocytosis, lymphopenia, neutrophil-to-lymphocyte ratio, platelet-to-lymphocyte ratio

INTRODUCTION

Coronaviruses are important human and animal pathogens. At the end of 2019, a novel coronavirus was identified as the cause of a cluster of pneumonia cases in Wuhan, a city in the Hubei Province of China.

It rapidly spreads, resulting in an epidemic throughout China followed by an increasing number of cases in other countries throughout the world. In February 2020, the World Health Organization (WHO) designated the disease COVID-19 which stands for coronavirus disease 2019[1]

Most patients with the novel corona virus infection were asymptomatic, yet patients with mild or moderate illness experienced dyspnea 1 week after contact. Severe ill patients progressed rapidly to acute respiratory failure, acute respiratory distress syndrome, metabolic acidosis, coagulopathy, and septic shock. Early identification of risk factors for severe illness facilitated appropriate supportive care and promptly access to the intensive care unit (ICU) if necessary. For mild patients, general isolation and symptomatic treatment were available and ICU care was needed unless the condition worsens rapidly to reduce the mortality and alleviate the shortage of medical resources. The incubation period for COVID-19 is thought to be within 14 days following exposure with most cases occurring approximately 4 to 5 days after exposure[2]

The patients with severe COVID-19 infection can develop a coagulopathy meeting criteria for disseminated intravascular coagulation per international society of thrombosis and hemostasis criteria with fulminant activation of coagulation resulting in widespread microvascular thrombosis and consumption of coagulation factors. This is reflected by thrombocytopenia, prolongation of the prothrombin time/international normalized ratio, partial thromboplastin time, elevation of D-dimer and decreased fibrinogen levels. Microangiopathy with schistocytes may be observed on the peripheral smear[3] .On the other hand, most of the severe cases demonstrated elevated levels of infection-related biomarkers and inflammatory cytokines such as serum ferritin and C-reactive protein[4]. Blood cell interactions are essential in the pathophysiology of inflammation, immune responses, hemostasis, and oncogenesis. Numerous observational studies have suggested that themneutrophil-to-lymphocyte ratio (NLR), lymphocyte proportion, and the platelet-to-lymphocyte ratio (PLR) are inflammatory markers of immune-mediated, metabolic, prothrombotic, neoplastic diseases, and are widely investigated as useful predictors for prognosis in many diseases[5-7]

Recent researches of COVID-19 indicated that severe patients tended to have higher NLR, PLR of COVID-19 between severe (severe and critical) and nonsevere (asymptomatic, mild, and moderate) cases was not fully reported, which may have prognostic values and influence duration of hospitalization and be important therapeutic targets[4,8] Finally, some viral infections such as Norwalk virus and hepatitis B virus have clear blood group susceptibility[9]

Recent studies also revealed that people with blood Group A have a higher risk, where as people with blood Group O have a lower risk for SARS-Cov-2 infection and COVID-19 severity. The distribution of ABO blood groups varies among different races, colors, countries, continents, and other geographical distributions of populations on the planet[9]

Because of the paucity of local and regional data the current work was conducted to extend to some extent knowledge about the relation of hematologic parameters and hence the need of the study.

Data Source And Patients

100 patients admitted to the Bapuji Hospital COVID-19 wards, medical reports of patients had been randomly selected. None of the selected patients had chronic disease or chronic use of medicine (s) that might affect the blood indices. All the patients of any age and gender were diagnosed as cases of COVID-19 depending on the WHO revised criteria for having polymerase chain reaction positive results for either nasal or posterior pharyngeal space.

Statistical Analysis

Data obtained were analyzed using the mean and percentages

Table 1: Demographic characteristics of patients with coronavirus disease-19

Age group	Covid + patients
<18yrs	Nil
18-45 yrs	29%
>45 yrs	71%
Sex	
Male	56%
Female	44%

Table 2: The frequencies of hematological parameters in patients with corona virus disease-19 in relation to degree of severity

TotalWBC count N(4000-11,000/ul	Neutrophils N(40-60%)	ANC N(2500-6000)	Lymphocytes N(20-40%)	ALC N(1000-4800)	Platelet count N(1.5-4.5)lakhs
>31	> 94	> 58	> 02	> Nil	> 02
N56	N 06	N 36	N 20	N 38	N 80
<13	< Nil	< 06	< 78	< 62	< 18

Table 3: The degree of severity in patients with Corona virus disease-19 in relation to N\L ratio

Neutrophil/Lymphocyte ratio (Normal 1-3)	Number of covid + patients
>3	64
N(1-3)	24
<1	12

Table 4: The degree of severity in patients with Corona virus disease-19 in relation to PLT\L ratio

Platelet/Lymphocyte ratio (132.40+/-43.68)	Number of covid + patients
>176	67
N(88-176)	30
<88	03

RESULTS

The demographic characteristics of patient with covid-19 as shown in table 1, revealed that males (56%) were more than females (44%) with overall mean age of 50 years (age ranged from <15 to > 85years).

DISCUSSION

Now a days, the COVID-19 outbreak has caused widespread concern and threatened the global public health security. This retrospective study was designed to include patients with covid-19, admitted to infectious wards at Bapuji Teaching Hospital(JJMMC). This study showed most cases between the age group of 15and 45 years because they are more likely to be in the workforce increasing their risk of exposure .

Male gender was more frequently affected than female in the current study . Severity categorization in current study showed that majority were mild, then moderate and less than 10% as severe on admission. The NLR in peripheral blood has been studied as a systemic inflammatory marker, and various studies have shown that it is a valid prognostic factor in various solid tumors[13]

In this study, we studied the NLR in relation to the disease outcome and length of hospitalization and showed patients (%) with N/L ratio ≥3.1, with age ≥65 years, and All patients had shorter duration of hospitalization (>07 days) .Our findings were consistent with those of previous studies (Yang et al. and Huang et al.) on the relationship between NLR and prognosis of many other infectious diseases[14,15] Furthermore, the study found that 67% patients had higher PLR, all of them had moderate while those (3%) with low PLR had severe disease. All patients with P/L ratio ≥ 176 had shorter duration of hospitalization (less than 7 days) Our findings were consistent with the previous study of Huang et al[15] in 31 %) was associated with moderate to severe disease. On the other hand, leukopenia 13(%) and lymphopenia (78%) was found only in patients with severe disease. Other changes in hematological parameters were neutrophilia (94%), thrombocytosis (2%) and thrombocytopenia(18%). The association The current study revealed that leucocytosis (found of lymphopenia with disease severity and outcome of COVID19 was also observed in other Asian studies, however the studied population showed obviously smaller percentage as compare to 63% from Wuhan and 42% of patients outside Wuhan [16,17] or 28% in Singapore[18] .

These differences could be explained by multiethnicity and smaller number of patients in this study might be related to initial local guidelines of treatments with admission of all symptomatic patients regardless the severity also thrombocytopenia in this study was associated with severity of disease a thing that was corresponding to the finding of meta analysis of Giuseppe Lippi et al[19]

CONCLUSION AND RECOMMENDATIONS

In conclusion the study found that the severity of COVID19 was associated with lymphopenia and elevated values of both NLR and PLR which are associated with good prognosis. Hematological parameters showed Increased WBC count with neutrophilia , lymphopenia and adequate platelet counts in Covid patients with mild to moderate symptoms. On the other hand, both values (NLR and PLR) could be used as hematological predictors for disease severity and the outcome because these parameters are related to the severity status. These values could be quickly calculated based on a blood routine test on admission.

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