ORIGINAL RESEARCH PAPER
Volume - 11 | Issue - 03 | March - 2022 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

PLATELET COUNT AND HAEMATOCRIT AS A MARKER OF DISEASE SEVERITY IN COVID -19.

General Medicine

Srilakshmi M Prabhu* Assistant Professor, Department of Medicine, Father Muller Medical College, Mangalore 575002, Karnataka. *Corresponding Author

Prasanth Y M Professor, Department of Medicine, Father Muller Medical College Mangalore 575005

Peter George Professor, Department of Medicine, Al Azhar Medical College, Thodupuzha 685605

ABSTRACT

INTRODUCTION AND AIM: Corona virus disease (COVID 19) has emerged as a pandemic with major concerns on mortality, morbidity and its impact on health-care infrastructure. The study aims to correlate platelet count and haematocrit as indicators of disease severity in COVID-19.
MATERIALS AND METHODS: In this descriptive case control study, among COVID-19 tested RT-PCR positive individuals, the platelet count, haematocrit and haemoglobin levels of 81 patients admitted to the wards and 92 patients admitted to the ICU were analysed and compared.
RESULTS: Comparison of Platelet values between the different groups showed that the moderate group had the highest value of 2.599286 lakh and the severe group had the least value of 2.0568 lakh. This difference was statistically significant with a test value of 3.259 and p value of 0.041. Comparison of the haematocrit value between the two groups showed that the haematocrit levels were higher in the mild group with a t value of 1.012 but the difference was statistically non-significant with a p value of 0.315. Comparison of haematocrit between the three groups did not show association with severity of the illness.
CONCLUSIONS: Patients with lower levels of platelet count had a higher risk of severe disease among those patients admitted with COVID 19 infection. However, haematocrit values did not show any such association with severity of the disease.

KEYWORDS

COVID 19, platelet count, haematocrit, haemoglobin, disease severity

INTRODUCTION

Coronavirus Disease- 2019 (COVID-19), caused by the SARSCoV-2, has emerged as a pandemic with major concerns for its high morbidity and mortality. The manifestations of COVID-19 disease range from minor flu like illness to severe acute respiratory distress syndrome (ARDS). The severe COVID- 19 is a critical illness causing acute respiratory distress, intravascular coagulopathy and multiorgan dysfunction syndrome (MODS). [1,2]

The 2019 novel coronavirus (2019-nCoV) or the severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) has rapidly spread all over the world in recent months.[1,2] The common clinical presentations of COVID 19 were fever, cough, sore throat, headache, fatigue, myalgia, breathlessness, diarrhoea, or loss of smell and taste. Severity of the disease can be graded into mild, moderate and severe as described by the Ministry of Health and Family Welfare (MOHFW).[3]

In order to optimize patient care and resource allocation during this pandemic, simple biomarkers are required to stratify the disease and predict its severity. Various biomarkers for severity and outcome of COVID 19 have been studied. The aim of our study was to relate variations in platelet count and haematocrit as early markers to stratify COVID 19 severity.

MATERIALS AND METHODS:

This descriptive case control study was initiated with approval from Institutional Ethics Committee, with sample size calculated using 95 % confidence interval and 90 % power; was conducted over 6 months from September 2020. The COVID 19 patients diagnosed by RT PCR admitted to the designated COVID wards /ICU were randomly chosen and divided as two groups based on severity.[3] A total of 92 patients were chosen from ICU with severe illness at the time of admission and 81 patients from those admitted to the wards with mild disease. Patients less than 18 years and those with chronic liver disease, chronic kidney disease, retroviral disease or any malignancy were excluded from the study.

After obtaining a written informed consent from the patient or caregiver, detailed clinical history, examination and investigations were captured to a preformatted data sheet. Later, complete blood counts and inflammatory makers like CRP, LDH, D-dimer and ferritin were performed and documented. Patients from ICU were further categorised into moderate and severe illness.[3] The data was analysed using chi square, independent t test, Posthoc Tukey tests and ANOVA tests.

RESULTS:

In this study, comparison of the platelet counts between the two groups that is; mild and moderate to severe group showed that platelet count was higher in moderate to severe group; which was statistically non-significant (p value of 0.977). However, comparison of platelet counts between the three groups showed that moderate group had the highest value of 2.599286 lakh and severe had the least value of 2.0568 lakh. This difference was statistically significant with a test value of 3.259 and p value of 0.041. Posthoc-Tukey tests comparing mild and moderate groups showed a mean difference of -0.299261 which was not statistically significant (p value of 0.27). Comparing the mild and severe groups showed a mean difference of 0.2432247: which again was not statistically significant (p value of 0.379).

Table 1 and 2 shows the correlation between hematological parameters, inflammatory markers and severity of COVID 19.

In the present study, when we compared the haemoglobin values on day 0 of admission among the two groups, it was found that haemoglobin levels was higher in the mild group with a t value of 2.074 and the difference was statistically significant with a p value of 0.04. However, comparison of haemoglobin levels between the three groups showed that mild group had the highest value of 13.123457 g/dl and severe had the least value of 12.3118g/dl but the difference was statistically insignificant with a p value of 0.095. Posthoc Tukey tests comparing mild and moderate groups showed a mean difference of 0.5020282 and was not statistically significant with a p value of 0.43.

Comparing the mild and severe groups showed a mean difference of 0.8116568 but was not statistically significant with a p value of 0.088. Also comparing moderate and severe groups showed a mean difference of 0.3096286 and was not statistically significant with a p value of 0.766.

Comparison of the Haematocrit between the two groups showed that Haematocrit was higher in Mild group with a t value of 1.012 and is statistically non-significant with a p value of 0.315. Comparison of haematocrit between three groups did not show association with severity of illness

CRP levels were higher in moderate/severe group with a t value of -2.05 and was statistically significant with a p value of 0.042.

However, D dimer and Ferritin levels did not show any association with severity of illness.

DISCUSSION

In our study, patients with severe COVID 19 infection had lower levels of platelets than those with moderate COVID 19. This finding can be of

clinical relevance while managing a large number of COVID 19 patients with limited health care resources.

It was observed that platelet count was significantly lower in patients with more severe COVID-19. Study by Lippia G et al, found low platelet count to be associated with fivefold risk of severe COVID-19.[4] A study from China with 1099 patients showed 36.2% to have platelet count below 150 $\times 10^9$/L. Among these patients with thrombocytopenia, 31.6% had non-severe and 57.7% had severe COVID-19.[5] Another study showed the frequency of thrombocytopenia in COVID 19 patients to be 12%.[6] Among COVID 19 patients who had severe manifestations, disseminated intravascular coagulation and high mortality, low platelet counts and coagulation dysfunctions were high.[5]

Comparison of the hemoglobin levels on day 0 of admission between the two groups showed that hemoglobin was higher in the mild group and was statistically significant with a p value of 0.04. Whereas, the hematocrit levels were higher in the mild group but not statistically significant with a p value of 0.315. Comparison of haemoglobin and haematocrit between the three groups did not show any difference of statistical significance.

A meta-analysis showed that haemoglobin values are essentially reduced in COVID-19 patients with severe disease, compared to those with milder forms and a progressive decrease in the haemoglobin concentration may reflect a worse clinical course.[7] A study done in Iran showed poorer outcome in patients with lower haemoglobin levels.[8] In a retrospective study done in Kumamoto City Hospital between February and April 2020; patients with lower levels of haemoglobin were observed to develop worsening pneumonia and mechanical ventilatory care.[9]

Comparison of the CRP between the two groups showed that CRP was higher in moderate/severe group and was statistically significant with a p value of 0.042 which is similar to similar previous studies.[10] In this study there was no correlation between D dimer or serum ferritin and severity of illness which is in contrast to similar previous studies.[10]

Limitations

As our study was a descriptive case control study comparing investigations and severity at the time of admission, any further progressive change in the laboratory parameters after admission could not be assessed.

CONCLUSIONS

In present study there was significant correlation between low platelet value and severe disease; when the patients were designated as mild, moderate and severe categories. Lower hemoglobin levels were associated with severe disease when we categorized COVID 19 patients into two groups. However, hematocrit value did not have any association with disease severity. Hence close monitoring is essential for patients who have lower platelet counts among those admitted to ICU with moderate or severe illness.

Conflict of interest

None to declare.

Table 1. Independent t-test to compare haemoglobin, haematocrit , platelet levels and inflammatory markers between mild and moderate to severe COVID 19 infection.

	Mild(n=81)	Moderate/Severe (n=92)	T	P VALUE
	Mean ± sd	Mean ± sd		
Haemoglobin [Day 0 admission]	13.12±2.03	12.45±2.2	2.074	**0.04**
Haematocrit	100.87± 551.19	38.91±8.76	1.012	0.315
Platelet (Lakhs)	2.3±0.8	2.3±1.2	-0.029	0.977
Total count	7191.36± 3790.49	11083.7±31808.31	-1.094	0.275
CRP	49.46±77.71	71.9±65.78	-2.05	**0.042**
D Dimer	414.13± 584.16	1271.96±5009.6	-1.63	0.106
Ferritin	513.63±899.5	736.06±1094.21	-1.449	0.149

Table 2. Comparison Of Haemglobin ,haematocrit, Platelet Counts And Inflammatory Markers Between Mild, Moderate And Severe COVID 19 infection.

	Mild (n=81)	Moderate (n=42)	Severe (n=50)	ONE WAY ANOVA	POSTHOC TUKEY TEST			
				F value (*=welch test)	P VALUE	Mild vs Moderate difference (p value)	Mild vs Severe difference (p value)	Moderate vs Severe difference (p value)
Haemoglobin [Day 0 admission]	13.12±2.03	12.62±2.2	12.31±2.2	2.388	0.095	0.5 (0.43)	0.81 (0.088)	0.31 (0.766)
Haematocrit	100.87± 551.19	40.16±10.77	37.86±6.54	0.579	0.562	60.71 (0.676)	63.01 (0.624)	2.3 (1)
Platelet (Lakhs)	2.3±0.8	2.6±1.19	2.06±1.17	3.259	**0.041**	-0.3 (0.27)	0.24 (0.379)	0.54 (0.031)
Total count	7191.36± 3790.49	7552.38± 3229.23	14050±43018 .67	0.754*	0.474	-361.02 (0.996)	-6858.64 (0.233)	-6497.62 (0.379)
CRP	49.46±77.71	62.79±67.08	79.7±64.3	2.737	0.068	-13.33 (0.591)	-30.24 (0.054)	-16.91 (0.501)
D Dimer	414.13± 584.16	817.91± 2985.18	1653.37± 6231.01	1.333*	0.271	-403.78 (0.832)	-1239.24 (0.149)	-835.47 (0.524)
Ferritin	513.63± 899.5	482.41±513.74	949.13± 1378.86	3.579	**0.03**	31.23 (0.985)	-435.5 (0.042)	-466.72 (0.068)

REFERENCES:

1. Bhatt T, Kumar V, Pande S, Malik R, Khamparia A, Gupta D. A Review on COVID-19. Stud Comput Intell. 2021;924(April):25–42.
2. Mattiuzzi C, Lippi G. Which lessons shall we learn from the 2019 novel coronavirus outbreak? Ann Transl Med. 2020;8(3):48-48.
3. Ministry of Health and Family Welfare. Goverment of India. Clinical Management Protocol for COVID19. 2020; 1–22. Available from: https:// www. mohfw. gov.in/pdf/ClinicalManagementProtocolforCOVID19.pdf
4. Lippi G, Plebani M, Michael B. Thrombocytopenia in severe Covid cases. Clin Chim Acta. 2020;506(January):145–8.
5. Bao C, Tao X, Cui W, Yi B, Pan T, Young KH, et al. SARS-CoV-2 induced thrombocytopenia as an important biomarker significantly correlated with abnormal coagulation function, increased intravascular blood clot risk and mortality in COVID-19 patients. Exp Hematol Oncol [Internet]. 2020;9(1):1–8. Available from: https://doi.org/10.1186/s40164-020-00172-4
6. Xu P, Zhou Q, Xu J. Mechanism of thrombocytopenia in COVID-19 patients. Ann Hematol. 2020;99(6):1205–8.
7. Lippi G, Mattiuzzi C. Hemoglobin value may be decreased in patients with severe coronavirus disease 2019. Hematol Transfus Cell Ther [Internet]. 2020;42(2):116–7. Available from: https://doi.org/10.1016/j.htct.2020.03.001
8. Faghih Dinevari M, Somi MH, Sadeghi Majd E, Abbasalizad Farhangi M, Nikniaz Z. Anemia predicts poor outcomes of COVID-19 in hospitalized patients: a prospective study in Iran. BMC Infect Dis. 2021;21(1):1–7.
9. Anai M, Akaike K, Iwagoe H. Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID- 19. The COVID-19 resource centre is hosted on Elsevier Connect , the company ' s public news and information . 2020;(January).
10. Gong J, Dong H, Xia Q, Huang Z, Wang D, Zhao Y, et al. Correlation Analysis between Disease Severity and Inflammation-related Parameters in Patients with COVID-19 Pneumonia. medRxiv. 2020;