Original Research Article

Study of platelet count in covid-19 positive patients admitted in a tertiary care hospital of South Bihar

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Abstract

Aim and objective: The aim of this study was to investigate platelet count in COVID-19 positive patients. **Material and methods:**This is an institution based retrospective type of cross sectional observational study were done in Narayan medical college and hospital, jamuhar, Sasaram. 500 covid 19 positive patients were include in this study. **Results:** The study is conducted in Narayan medical college and hospital, jamuhar, Sasaram for 6 months period including in-hospital patients (average of stay in hospital 9.32 ± 7.56) with covid 19 diagnosed by PCR & non-enhancing chest CT scan, the including patients were 500 with mean age 44.24 ± 16.42 years with 50% male & 50% female the majority with pneumonia but non critical & no one had clinically significant bleeding with the majority did not need RCU. For all patients included in the study (PCR&CT+vecases) the platelets count show statistically significant increment when compare between the admission & discharge. **Conclusion:** We concluded that the increase in platelets level is a good indicator for recovery from covid in both PCR & CT + ve patients. The CT +ve patients show more platelets level on admission & on discharge. The increase in platelets level not reflect mortality 6- The age show –ve correlation with admission platelets levels.

Keywords: platelet, coronavirus, thrombocytopenia.

Introduction

Since its emergence in December 2019, the outbreak of novel Coronavirus Disease 2019 (COVID-19) outbreak has infected over 86,09,516people globally with nearly 4,56,960 deaths[1].Whereas in India total 382143 people got affected with nearly 12610 deaths reported so far[2].

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) leads to various infections including COVID-19 infection , which produces a respiratory and systemic illness which progresses to a severe form of pneumonia in 10–15% of patients[3].Severe COVID-19 infection can land up in critical illness, with complications like acute respiratory distress (ARDS) and multi-organ dysfunction primarily, eventually followed by intravascular coagulopathy[4].

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The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) leads to various infections including COVID-19 infection , which produces a respiratory and systemic illness which progresses to a severe form of pneumonia in 10–15% of patients[3]. Severe COVID-19 infection can land up in critical illness, with complications like acute respiratory distress (ARDS) and multi-organ dysfunction primarily, eventually followed by intravascular coagulopathy[4]. It also causes cytokine storm,DIC leading to pulmonary embolism. Few studies have shown platelet count is independently associated with disease[5-7].In order to optimize patient care and resource allocation during this pandemic, biomarkers are urgently needed for stratifying patients' risk and for actively monitoring illness severity.

Moreover, a low platelet count correlates with higher disease severity scores such as Multiple Organ Dysfunction Score (MODS), Simplified Acute Physiology Score (SAPS) II, and Acute Physiology and Chronic Health Evaluation (APACHE) II.[6] In the severe acute respiratory syndrome (SARS) outbreak, thrombocytopenia was reported to occur in up to 55% of patients and was identified as a significant risk factor for mortality[8,9].

Platelet count, with hypoxemia, were the only two variables used by Zou et al. for developing a SARS prognostic model which displayed 96.2% accuracy[10].

There is scarcity of established laboratory markers available to evaluate illness severity in Coronavirus disease 2019 (COVID-19). In the present study, we aim to investigate whether platelet count could differentiate between COVID-19 patients with or without severe disease. Additionally, we evaluate if thrombocytopenia is associated with severe COVID-19.

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Material and Methods

Type of study
This is an institution based retrospective type of cross sectional observational study.
Place of study
Narayan medical college and hospital, jamuhar, Sasaram
Sample size
500 covid 19 positive patients admitted in our hospital from 1st april 2020.
Duration of study- 6 months or till the sample size target is achieved
Inclusion criteria-All the COVID-19 positive cases admitted in our hospital from 1st April till completion of research work will be included.
Asymptomatic COVID positive
Mild form of disease: mild fever, cough, sore throat, nasal congestion, malaise, headache and ARDS is further categorized into 3 groups: Mild, moderate and severe type of ARDS
Statistical analysis will be performed, with calculation of difference and 95% confidence interval (95% CI) of platelet number in COVID-19 patients (asymyptomatic and mild form), as well as the odds ratio (OR) of thrombocytopenia for severe COVID-19. Subgroup analysis will be performed based on study definition of severity. The statistical analysis will performed by STATA 11.2 (College station TX USA).
Exclusion criteria

- COVID-19 positive patients with past history of coagulation dysfunction,
- COVID-19 positive patients suffering malaria or dengue.
- COVID-19 patients with moderate and severe disease

Moderate form: Pneumonia with no signs of severe disease SpO2 90 to <94% with dyspnea and or hypoxia, fever, cough and tachypnea.
Severe form of disease includes severe Pneumonia and Acute Respiratory distress syndrome. Former one is diagnosed on the basis of clinical symptoms of pneumonia plus one of the following:
- Respiratory rate >30 cpm.
- Severe respiratory distress.
- SpO2 < 90% on Room air.

All the documents reporting information on platelet count (either the value or the rate of thrombocytopenia) in COVID-19 patients will be categorized as mild, moderate and severe according to GOI guidelines.[11] and clinically validated definition of various forms of disease will be finally included in our study are asymptomatic, mild, moderate and severe.

Results

The study is conducted in Narayan medical college and hospital, jamuhar, Sasaram for 6 months period including in-hospital patients (average of stay in hospital 9.32 ± 7.56) with covid 19 diagnosed by PCR & non-enhancing chest CT scan , the including patients were 500 with mean age 44.24 ± 16.42 years with 50% male & 50% female the majority with pneumonia but non critical & no one had clinically significant bleeding with the majority did not need RCU. For all patients included in the study (PCR & CT +ve cases) the platelets count show statistically significant increment when compare between the admission & discharge.
Table 1 show the patients distribution with COIVD 19 according to study variables (age, gender, symptoms, duration of resolution of the clinical features, clinically significant bleeding, severity (need for RCU), death and stay in hospital).

Table 1: Patients Distribution with the study variables (n=500)

Study variables		
Age (years)	(44.24 ± 16.42)	(13-78)
Duration of resolution of the clinical features (days)	(2.35 ± 0.945)	(1-6)
Hospital stay (days)	(9.32 ± 7.56)	(1-24)
Gender		
Female	250	50 %
Male	250	50%
Total	500	100%
Symptoms		
Pneumonia	390	78%
No pneumonia	110	22%
Total	500	100.0%
Severity (need for RCU)		
Yes	40	8%
No	460	92%
Total	500	100%
Death		
Yes	36	7.2%
No	464	92.8%
Total	500	100%

As seen with table 2: There were statistically significant differences among means of platelets count on admission and on discharge.

Table 2: The mean differences of platelets count on two assessment periods on admission and on discharge

Study variables	**Assessment periods**	**N**	**Mean**	**SD**	**Paired t-test**	**P-value**
Platelets count	On admission	500	241.22	62.48	-6.548	<0.001*
	On discharge	500	274.23	63.11		

*P value ≤ 0.05 was considered as significant.

In table 3: among patients with PCR positive, there were significant differences between means of platelets count on admission and on discharge.

Table 3: The mean differences of platelets count on two assessment periods on admission and on discharge in PCR +ve patients.

Study variables	Assessment periods	N	Mean	SD	Paired t-test	P-value
Platelets count	On admission	250	224.23	55.02	-3.584	0.001*
	On discharge	250	250.42	57.98		

*P value ≤ 0.05 was considered as significant

In table 4: Among patients with CT positive there were significant differences between means of platelets count on admission and on discharge.

Table 4: The mean differences of platelets count on two assessment periods on admission and on discharge

Study variables	Assessment periods	N	Mean	SD	Paired t-test	P-value
Platelets count	On admission	250	256.24	65.32	-5.879	<0.001*
	On discharge	250	297.47	59.21		

*P value ≤ 0.05 was considered as significant.

Table 5: Shows there were significant differences between means of platelets count on between two study groups.

Table 5: The mean differences of platelets count on admission and on discharge according to type of patients

Platelets count	Group 7718955555	N	Mean	SD	t-test	P-value
On admission	PCR positive	250	224.23	55.02	-2.287	0.022*
	CT positive	250	256.24	65.32		
On discharge	PCR positive	250	250.42	57.98	-3.489	0.001*
	CT positive	250	297.47	59.21		

Table 6: The correlation between of platelets count on admission and study variables including (age, duration of resolution of the clinical features and stay in hospital). There was significant negative correlation between platelets count on admission and age.

Table 6: The correlation between of platelets count on admission and study variables

Study variables	N	Mean	SD	t-test	P-value
Age (years)	500	44.24	16.42	-0.251	0.03*
Platelets count on admission	500	241.22	62.48		
Duration of resolution of the clinical features (days)	500	(2.35	0.945	-0.162	0.177
Platelets count on admission	500	241.22	62.48		
Stay in hospital (days)	500	9.32	7.56	-0.222	0.061
Platelets count on admission	500	241.22	62.48		

Table 7: The mean differences of platelets count on admission according to study variables including (gender, symptoms, severity (need for RCU) and death).There were no significant differences between means of platelets count on admission and study groups.

Table 7: The mean differences of platelets count on admission according to study variables

Study variables	Study group	N	Mean	SD	t-test	P-value
Gender	Male	250	242.74	66.12	0.252	0.789
	Female	250	238.12	58.12		
Symptoms	Pneumonia	390	242.23	65.26	0.287	0.712
	No pneumonia	110	236.87	53.74		
Severity (need for RCU)	Yes	40	257.26	75.05	0.752	0.477
	No	460	238.98	60.43		
Death	Yes	36	274.87	69.12	1.374	0.162
	No	464	237.36	60.84		

Table 8: There were significant negative correlation between platelets count on discharge and duration of resolution of the clinical features and stay in hospital.

Table 8: The correlation between of platelets count on discharge and study variables

Study variables	N	Mean	SD	t-test	P-value
Age (years)	500	44.24	16.42	-0.084	0.489
Platelets count on discharge	500	241.22	62.48		
Duration of resolution of the clinical features (days)	500	(2.35	0.945	-0.298	0.014*
Platelets count on discharge	500	274.23	63.11		
Stay in hospital (days)	500	9.32	7.56	-0.326	0.003*
Platelets count on discharge	500	274.23	63.11		

Table 9: There were no significant differences between means of platelets count on discharge and study groups.

Table 9: The mean differences of platelets count on discharge according to study variables

Study variables	Study group	N	Mean	SD	t-test	P-value
Gender	Male	250	284.24	65.22	1.247	0.226
	Female	250	265.36	60.33		
Symptoms	Pneumonia	390	275.77	64.26	0.887	0.376
	No pneumonia	110	262.29	56.88		
Severity (need for RCU)	Yes	40	234.88	77.96	-1.663	0.089
	No	460	277.77	60.63		
Death	Yes	36	252.11	72.22	-0.875	0.387
	No	464	275.29	63.11		

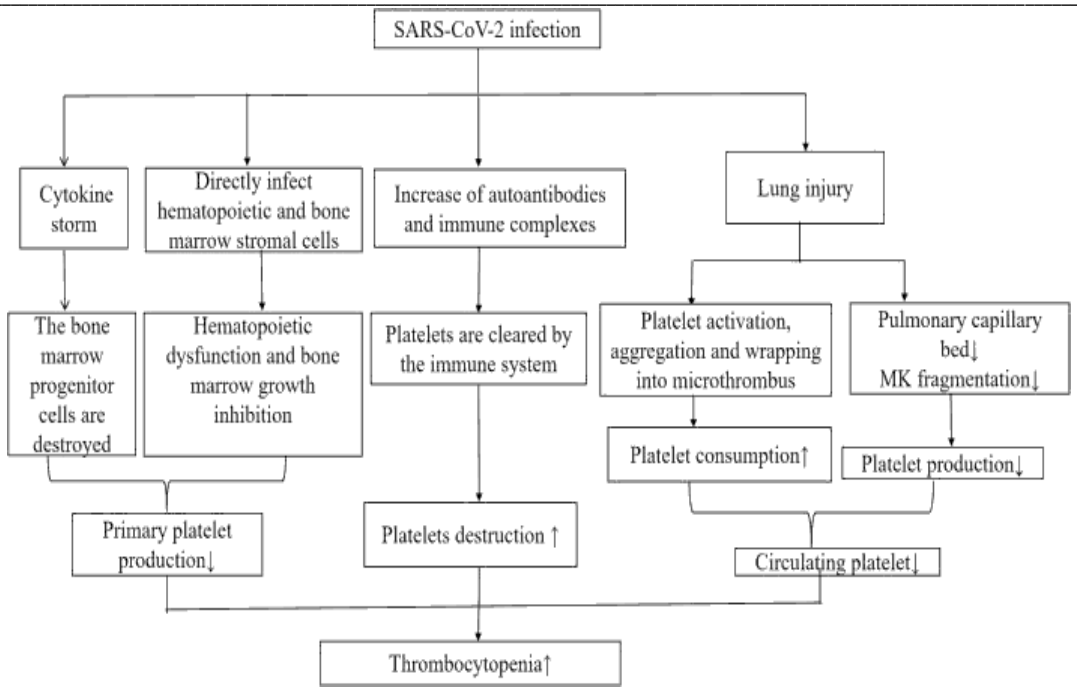

Fig.1: SARS-CoV-2 Infection

Discussion

The study is conducted in Narayan medical college and hospital, jamuhar, sasaram for 6 months period including in-hospital patients (average of stay in hospital 9.32 ± 7.56) with covid 19 diagnosed by PCR & non-enhancing chest CT scan , the including patients were 500 with mean age 44.24 ± 16.42 years with 50% male & 50% female the majority with pneumonia but non critical & no one had clinically significant bleeding with the majority did not need RCU. For all patients included in the study (PCR & CT +ve cases)the platelets count show statistically significant increment when compare between the admission & discharge No. & this finding is go with most study as the increment indicate healing.[12,13,14] In the presence of this rapidly emerging, novel infection uncharacteristic of the era of modern medicine, identification of biomarkers that could predict disease severity and prognosis are essential to guiding clinical care. Uniquely to COVID-19, a wide range of variability in disease severity is observed ranging from asymptomatic to critical.[3] As such, biomarkers are needed to identify severe disease among hospitalized patients. In this study, we found that platelet count may be a simple, economic, rapid and commonly available laboratory parameter that could straightforwardly discriminate between COVID patients with and without severe disease. Moreover, we will observe whether thrombocytopenia is also associated with any enhanced risk of severe COVID-19. Thrombocytopenia is commonplace in critically ill patients, and usually suggests serious organ malfunction or physiologic decompensation as opposed to primary hematologic etiology, as well as the development of intravascular coagulopathy, often evolving towards disseminated intravascular coagulation (DIC).[15]In COVID-19 patients, the mechanism for thrombocytopenia patients is likely multi factorial. In SARS, it was suggested that the combination of viral infection and mechanical ventilation leads to endothelial damage triggering platelet activation, aggregation and thrombosis in the lung, causing vast platelet consumption.[8] Moreover, as lung may be a site of platelet release from fully mature megakaryocytes, a decrease or morphologic alternation in the pulmonary capillary bed may lead to deranged platelet defragmentation [8]. Coronaviruses may also directly infect bone marrow elements resulting in abnormal hematopoiesis, or trigger an auto-immune response against blood cells[8,16]. It also has been suggested that a consistently present low grade DIC may propagate a low platelet count in SARS[8]. However, as noted by the World Health Organization (WHO), significant differences are observed between SARS and COVID-19[3]. As such, the pathophysiologic mechanisms behind each infection are likely to differ[16].Outside findings from the early small, retrospective studies on this emerging pathogen, limited data is available on clinically useful biomarkers for severe COVID-19.In a meta-analysis of early COVID-19 studies, procalcitonin was found to proffer a nearly 5-fold higher risk of severe infection (OR, 4.76; 95% CI, 2.74–8.29)[17]. The admission & discharge levels were both higher in CT + ve patients than in PCR +ve patients which may indicate more severe inflammatory reaction with better response when the disease disappear, there are no other studies discussing these facts up to our knowledge. On admission level was affected by age only as the older the age the lower the level which may be explain by age changes[14]. While the discharge level] affected by duration of resolution, stay in hospital which was expected as the more days in hospital mean more severe with less platelets increment[18].In both admission & discharge the levels were not predictor to need for RCU nor for mortality but this is not go with other study the differences may be due to small sample size or different normal values.

Conclusion

We concluded that the increase in platelets level is a good indicator for recovery from covid in both PCR & CT + ve patients. The CT +ve patients show more platelets level on admission & on discharge. The increase in platelets level not reflect mortality 6- The age show – ve correlation with admission platelets levels.

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