

Platelets Profile Changes in Patients with COVID 19

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ABSTRACT

The COVID 19 is a recent condition due to the coronavirus sar-cov2 which started in Wuhan at December 2019 and spread all over the world to cause one of the most serious pandemic in the human history as it declared by the WHO as pandemic on February 2020. 78 patients with the confirmation of COVID 19 were included (done by PCR of both nasopharyngeal & oropharyngeal swabs or by non-contrast chest CT, for all the platelets count were done at admission & on discharge & to see the relation with age, stay in hospital, days for symptoms resolution, RCU need & death, the results show that the platelets increment show more in discharge patients with mean features of recovery in both CT & PCR +ve patients but not predict mortality or need for RCU admission

Keywords: platelet, coronavirus, Wuhan, thrombocytopenia

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INTRODUCTION

The COVID 19 is a serious disease that affects humankind causing one of the most serious pandemics in human history. It is caused by the coronavirus family, which is named SARS-CoV-2. The disease was first reported in Wuhan, China, in December 2019, then spread rapidly to become a pandemic as announced by the WHO in February 2020.

The disease affects seriously & fatally the respiratory system, but other systems are also affected. One of them is the hematological system. The abnormalities in the blood pictures vary between studies but most of them show low lymphocyte and thrombocytopenia but normal WBCs. Prolonged activated partial thromboplastin time but most of patients had normal prothrombin time, 26% had elevated D-dimer levels [1]. In one study, two out of seven show low platelets, and two report high D-dimer [2]. Another study reports that 82.1% of patients had low lymphocytes & 36.2% with low platelets while 33.7% show low WBCs [3]. All these changes are seen more in severe cases [3]. Other study 72.5% developed low platelets [4]. Lastly a number from 41 cases in Wuhan report 5% with low platelets [5]. A larger cohort reports that thrombocytopenia in non-survivors more than in survivors' hospitalization [6]. In the majority of cases, the platelet did not reduce to a reading causing clinical bleeding, the mechanisms that the coronavirus affects the hematopoietic system are unclear. The possible mechanisms:

- 1- Reduction in platelets production: mostly caused by bone marrow aplasia leading to decrease in the production either caused by cytokines effect or direct coronavirus effect on the marrow of the bone.
- A- Primary platelets formation defect: low platelets due to SARS-CoV-2 is as that due to SARS-CoV and HCoV-229E as it is supposed that SARS-CoV-2 similarly arrests hematopoiesis in the bone marrow by some receptors leading to low production of thrombocytes. The possible mechanism in Human aminopeptidase N (CD13) is a metalloprotease which is seen on the top of epithelial cells in the intestine, kidneys, and lungs and also seen in granulocytes, monocytes, activated

endothelial cells, lymphocytes, and platelets. The coronavirus does through the marrow of the bone to the platelets through CD13 receptors and causes growth arrest and apoptosis causing deviated hematopoiesis and low platelets

- B- Secondary hemophagocytic lymphohistiocytosis: It is suggested that when the cytokine storm occurs the interleukin 6 & GM-CSF stimulate CD14+CD16+ inflammatory mononuclear macrophages to release more interleukin-6 that damages the hematopoietic progenitor cells in bone marrow including the megakaryocytes which cause low platelets in the peripheral blood.
- 2- Increase in thrombocyte damage: also, some mechanisms are possible as:
 - A- Immune mediated damage similar to HIV infection, with formation of antibodies or Ag-Ab complexes that settle on the surfaces of thrombocytes to be seen by the reticulo-endothelial system leading to platelets will be destructed as abnormal tissues.
 - B- Viral infection can cause pulmonary injury mostly in the endothelial cells with the activation of the thrombocytes causing aggregation and production of micro-thrombi, which more thrombocytes consumption in the lung circulation.

PATIENTS AND METHODS

A multi-center cohort study conducted in Babylon / Iraq from February to May 2020 in Merjan Medical City & Al Hilla Teaching Hospital including 78 patients with COVID 19 all need hospital admission

Including criteria:

- 1- PCR +ve or CT go with classic COVID19 according to the British radiology society
- 2- No history of blood dis. Before

For all patients CBP was done with platelet count recorded & before discharging it repeated again

Admission & discharge levels were correlated with:

- Symptoms as pneumonia (fever, cough, sputum or SOB) & non-pneumonia (other) as pneumonia symptoms labeled 1 and other symptoms as 2

- Duration of resolution of the clinical features in days (disappearance of fever without drugs, normal Resp. rate, improvement of the cough > 50 %)
 - Clinically significant bleeding
 - Severity: need for aggressive O2 treatment or RCU
 - Death
 - Results of 1st PCR sample for cure
- Admission & discharge levels were compared between the PCR +ve & CT +ve groups
- Results
- Table 1 show the patients distribution with COVID 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=78)

Study variables		
Age (years)	(45.74 ± 17.34)	(12-82)
Duration of resolution of the clinical features (days)	(2.27 ± 0.921)	(1-4)
Hospital stay (days)	(9.04 ± 7.75)	(1-26)
Gender		
Female	39	50.0%
Male	39	50.0%
Total	78	100.0%
Symptoms		
Pneumonia	61	78.2%
No pneumonia	17	21.8%
Total	78	100.0%
Clinically significant bleeding		
Yes	0	0.0%
No	78	100.0%
Total	78	100.0%
Severity (need for RCU)		
Yes	7	9.0%
No	71	91.0%
Total	78	100.0%
Death		
Yes	39	50.0%
No	39	50.0%
Total	78	100.0%

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	78	239.41	61.53	-6.637	<0.001*
	On discharge	78	273.10	62.71		

*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	39	223.77	54.49	-3.566	0.001*
	On discharge	39	249.85	58.24		

*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	39	255.05	64.80	-5.968	<0.001*
	On discharge	39	296.36	58.87		

*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	N	Mean	SD	t-test	P-value
On admission	PCR positive	39	223.77	54.49	-2.307	0.024*
	CT positive	39	255.05	64.80		
On discharge	PCR positive	39	249.85	58.24	-3.507	0.001*
	CT positive	39	296.36	58.87		

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)	78	45.74	17.34	-0.246	0.03*
Platelets count on admission	78	239.41	61.53		
Duration of resolution of the clinical features (days)	78	2.27	0.921	-0.151	0.188
Platelets count on admission	78	239.41	61.53		
Stay in hospital (days)	78	9.04	7.75	-0.216	0.057
Platelets count on admission	78	239.41	61.53		

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	39	241.15	65.89	0.249	0.804
	Female	39	237.67	57.65		
Symptoms	Pneumonia	61	240.51	64.16	0.297	0.767
	No pneumonia	17	235.47	52.52		
Severity (need for RCU)	Yes	7	255.86	75.05	0.739	0.462
	No	71	237.79	60.43		
Death	Yes	6	271.67	68.27	1.343	0.183
	No	72	236.72	60.68		

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)	78	45.74	17.34	-0.078	0.498
Platelets count on discharge	78	273.10	62.71		
Duration of resolution of the clinical features (days)	78	2.27	0.921	-0.275	0.015*
Platelets count on discharge	78	273.10	62.71		
Stay in hospital (days)	78	9.04	7.75	-0.334	0.003*
Platelets count on discharge	78	273.10	62.71		

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	39	282.03	64.89	1.261	0.211
	Female	39	264.18	59.95		
Symptoms	Pneumonia	61	276.36	64.33	0.868	0.388
	No pneumonia	17	261.41	56.76		
Severity (need for RCU)	Yes	7	235.57	77.57	-1.679	0.097
	No	71	276.80	60.45		
Death	Yes	6	251.00	72.33	-0.897	0.372
	No	72	274.94	62.06		

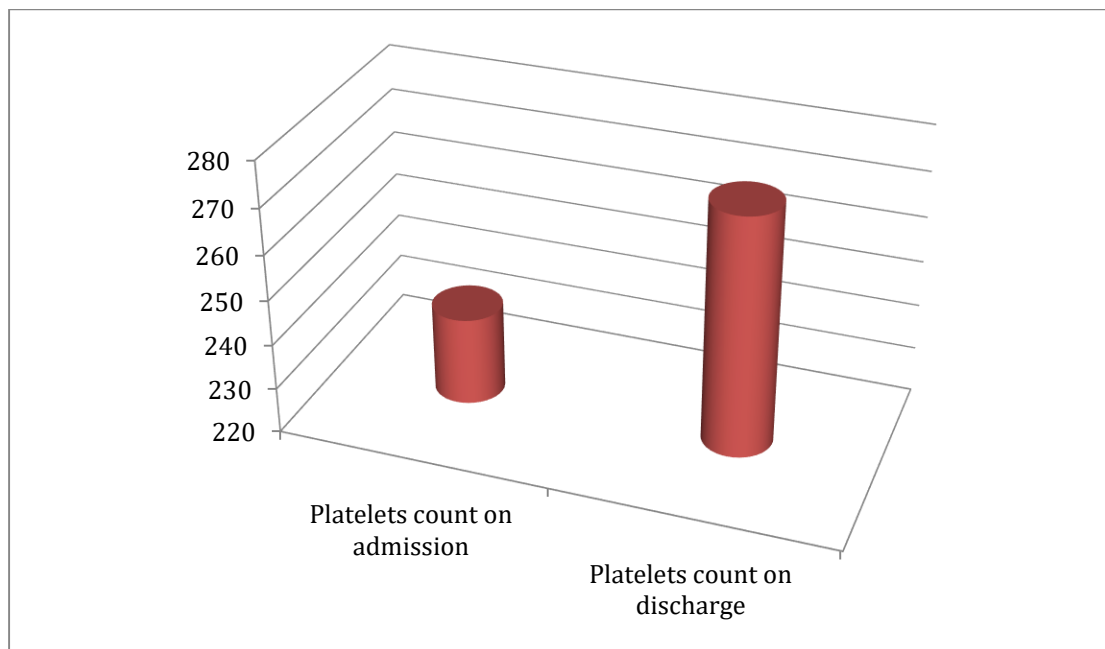


Fig 1. Comparison between platelets count on admission and on discharge

DISCUSSION

The study is conducted in Hilla city / Iraq from February 2020 to May 2020 including in-hospital patients (average of stay in hospital 9.04+/-7.75) with covid 19 diagnosed by PCR & non-enhancing chest CT scan , the including patients were 78 with mean age 45.47 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[5,7,8].

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 [8]. 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 [2]. 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

- 1- The increase in platelets level is a good indicator for recovery from covid in both PCR & CT +ve patients.
- 2- The CT +ve patients show more platelets level on admission & on discharge
- 3- This indicator is work both for pneumonia & non-pneumonia patients
- 4- This indicator does not predict need for RCU
- 5- The increase in platelets level not reflect mortality
- 6- The age show -ve correlation with admission platelets levels

RECOMMENDATION

- 1- To conduct larger study about the platelet's functions in covid
- 2- To see the clinical significance of low & increasing platelets in covid
- 3- To recommend a larger study to correlate the platelets with the CT severity score, the types of treatment & the diseases severity

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