

LETTER TO THE EDITOR

Isolated erythrocytosis: A consequence of COVID-19 induced hypoxia

Dear Editors,

COVID-19 convalescent plasma is collected from recovered patients and provides passive immunity to newly diagnosed COVID-19 patients. Out of 3812 convalescent plasma donors presenting at our centre, erythrocytosis with a haemoglobin level of more than 18 g/dL was detected in 21 donors during the laboratory screening. These plasma donors were given 500 ml of water (fluid challenge) to rule out dehydration by the on-duty nursing staff and the phlebotomist, and their complete blood count was repeated after 30 min. Even after a fluid challenge, eight donors showed no change in the haemoglobin and haematocrit values and were classified as isolated erythrocytosis. All the donors had been diagnosed with RTPCR tests and were symptom free for at least 28 days before they presented for donation. They fulfilled all the preliminary eligibility criteria and consented to plasma donation process. All the donors were male, with age ranging from 21 to 44 years. Total plasma protein level was done along with other tests, and it was of more than 60 g/L fulfilling the donation requirements as per the Drug and Cosmetic Act, 1940.¹

On review of the history of baseline condition during infection of these donors, five had a history of symptomatic COVID-19, while the rest were asymptomatic. Seven donors had no history of smoking, while one was an occasional smoker (one-two cigarettes per month). None of them had stayed at high altitudes or a family history of haematological disorders (polycythaemia vera and malignancies). On clinical examination, their vitals were within the normal range, and none of the donors showed any signs/symptoms of dehydration. The mean haemoglobin of the donors at presentation was 20.25 ± 1.86 g/dL, while at diagnosis of COVID-19, it was 16.68 ± 0.84 g/dL; thus, a significant rise ($P = .001$) in haemoglobin

levels post-COVID-19 was observed on the paired t test (Table 1). The donors were counselled and deferred due to the high haemoglobin level (one donor had thrombocytopenia also) and were referred to a haematologist. Authors tried to follow up with them further for their repeat CBC level after 1 and 3 months, but none of the donors were turn up to our hospital for sampling in view of the second wave of COVID-19. Compared with the 5322 donors who presented for apheresis and whole blood donation at our centre during the pre-COVID-19 era (July 2019 to November 2019), high haemoglobin levels were observed in only nine donors. This difference was highly significant on the chi-square test ($P = .003$). Thus, we found a positive association between COVID-19 infection and high haemoglobin. A recent observational study by Fan et al revealed that haematologic manifestations are commonly associated with COVID-19 infection irrespective of disease severity.² A retrospective study on 208 mild COVID-19 patients showed a significantly higher mean haemoglobin level in noncomorbid patients with a good compensatory mechanism.^{2,3} A proteomic study on COVID-19 patients revealed alterations in the integrity of red cell membrane and structural proteins, suggesting abnormalities in functional haemoglobin levels, which may lead to silent hypoxemia.⁴ A research review showed that erythropoietin administration in severe COVID-19 patients with anaemia had a favourable response, as evidenced by a rise in the haemoglobin levels.⁵ We hypothesize that compensatory mechanisms are intact in the patients with mild COVID-19, and more erythropoietin is produced, leading to a rise in haemoglobin, haematocrit and RBC counts in response to hypoxia. Furthermore, there might be different mechanisms causing raised erythropoietin levels in COVID-19 patients. Extensive research on haematological parameters is required to study this hypothesis on a larger scale.

TABLE 1 Complete blood count during active COVID-19 infection and predonation

Parameters	Donor-1 Age: 29		Donor-2 Age: 23		Donor-3 Age: 30		Donor-4 Age: 44		Donor-5 Age: 21		Donor-6 Age: 36		Donor-7 Age: 32		Donor-8 Age: 23	
	B	D	B	D	B	D	B	D	B	D	B	D	B	D	B	D
Haemoglobin (g/dL)	16.2	21.0	17.2	22.1	16.5	18.7	15.5	18.4	17.0	19.6	17.5	20.3	17.8	23.5	15.7	18.4
Haematocrit (%)	48.1	63.8	51.1	67.7	45.8	53.6	44.8	52.5	53.5	54.8	56.3	57.7	53.6	64.9	45.8	51.2
MCV (fL)	86.3	88	85.0	86.6	88.0	85.9	82	86.3	85.8	92.4	88	76.9	85.9	87.1	86.3	87.2
RBC Count ($10^{12}/L$)	5.83	7.22	6.66	7.82	5.55	6.24	6.02	6.08	5.20	5.93	6.02	7.50	6.65	7.45	5.34	5.87
MCH (pg)	28.1	28.8	28.4	29.0	28	30.0	27.2	30.3	30.0	33.1	30.5	27.1	33.7	31.5	29.7	31.3
MCHC (g/dL)	35.5	32.8	31.3	33.5	33	34.9	34.5	35.0	38.4	35.8	39.4	35.2	35.6	36.2	33.6	35.9
WBC count ($10^9/L$)	6.5	4.2	8.4	3.4	5.4	3.8	7.6	5.9	6.2	7.7	3.5	6.1	5.2	4.6	6.6	3.2
Platelet count ($10^9/L$)	162	130	286	63	166	143	288	201	219	278	154	208	162	111	158	233
N:L ratio	0.9	4.11	0.87	3.75	0.5	1	0.8	1.1	1.5	2.88	1.2	0.7	0.6	1.4	2.4	0.9

Abbreviations: B, Baseline (haemogram at time of diagnosis of COVID-19); D, Predonation (haemogram at time of plasma donation); MCH, mean corpuscular haemoglobin; MCHC, mean corpuscular haemoglobin concentration; MCV, mean corpuscular volume; N:L ratio, neutrophil:lymphocyte ratio.

KEYWORDS

COVID-19, erythrocytosis, haemoglobin

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CONFLICT OF INTEREST

The authors have no competing interests.

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