



# Arterial blood gas values in COVID-19 patients from a health center in Peru

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## Dear Editor

In many pathologies, acid-base balance disorders can cause complications and become a risk factor that can lead to death, the monitoring and analysis of arterial blood gas is of great importance in the diagnosis and management of the state of oxygenation and acid-base balance of patients (1).

An arterial blood gas (ABG) test is a common laboratory test that is the gold standard for evaluating respiratory failure and acid-base balance disorders. (2). In this test, the arterial oxygen pressure (PaO<sub>2</sub>) value gives us information about the oxygenation state and the arterial carbon dioxide pressure

(PaCO<sub>2</sub>) value gives us an idea about the state of ventilation (acute respiratory failure or chronic) and the acid-base state. The first thing that is observed when evaluating arterial gases is the pH, which remains in a range between (7.35 - 7.45). A small variation in pH results in a change in the concentration of hydrogen ions. (3). Another important parameter is the relationship between PaO<sub>2</sub> and inspired oxygen concentration is called PaO<sub>2</sub> / FiO<sub>2</sub>, this index is useful to determine the severity of alteration in gas exchange in a healthy individual. It is expected that the PaO<sub>2</sub> / FiO<sub>2</sub> ratio is greater than 50, patients with lung injury or respiratory distress syndrome have values below 40 and 26.7 respectively (4). Other data evaluated are the value of bicarbonate (HCO<sub>3</sub>), the excess of bases, the anion gap, electrolytes (sodium, potassium, ionized chloride and magnesium), glucose, lactate and creatinine, these variables provide important and timely clinical data on metabolism and respiratory function of a patient that are essential for diagnosis and treatment (5). Although oxygenation and ventilation can be assessed by pulse measurement and carbon dioxide monitoring, arterial blood gas analysis remains as the standard test.

In the context of the COVID-19 pandemic, the clinical follow-up of secondary hypoxemia caused by SARS-CoV-2 includes performing arterial blood gases, with non-invasive monitoring of oxyhemoglobin saturation (pulse oximetry), interspersed between blood gas measurements. (6). In order to determine the values of arterial gases in patients with COVID-19, a study was carried out in the Amazon hospital, the sample consisted of 47 hospitalized patients between June and July. The data can be found at <https://doi.org/10.6084/m9.figshare.14370494.v1>

Table 1 shows ABG test results in COVID-19 patients from the COVID hospitalization area with mechanical ventilation (high and low flow cannula). The median for the fraction of inspired oxygen (FiO<sub>2</sub>) was 30 (IQR 31) and a range between 21-100. Values for pH ranged from 6.92-7.57 with a median of 7.45 (IQR 0.09). The median for the partial pressure of oxygen (pO<sub>2</sub>) was 67 mmHg (IQR 29 mmHg) and a range between 30-170 mmHg. The median pCO<sub>2</sub> was 34.8 mmHg (IQR 14.1 mmHg) with a range between 10-108 mmHg. Hct values ranged from 16-62 with a median of 42.5% (IQR 13%). The range for tHb was 5.4-20.9 g / dL with a median of 13.9 g / dL (IQR 2.9). The median SO<sub>2</sub> was 92.3% (IQR 5.9%) and a range between 68-100%. Regarding electrolytes, the median of Na<sup>+</sup> was 138.2 mmol / L (IQR 5.4 mmol / L) and a range between 127-155, K<sup>+</sup> had a median of 3.8 mmol / L (IQR 0.8 mmol / L), Ca<sup>++</sup> values ranged from 0.55-1.35 mmol / L with a median of 1.18 mmol / L (IQR 0.09) and for Cl<sup>-</sup> the median was 107 mmol / L (IQR 9) and a range between 96-131 mmol / L. The pO<sub>2</sub> / FiO<sub>2</sub> values ranged between 225.5 mm / Hg

(IQR 164 mm / Hg) and a range of 48-566 mm / Hg. The median anion gap was 10 mmol / L (IQR 6) and a range of 1-34.1 mmol / L. The median mOsm was 282.9 mOsm / L (IQR 12.3) and a range between 260.2-321.5 mmol / L.

Table 1. Arterial Gasometry in COVID-19 Patients

Parameter	Median	IQR	Range
FiO2	30	31	21-100
pH	7,45	0,09	6,92-7,57
pO2 (mmHg)	67	29	30-170
pCO2 (mmHg)	34,8	14,1	10-108
Hct (%)	42,5	13	16-62
tHb (g/dL)*	13.9	2.9	5.4-20.9
sO2 (%)*	92,3	5,9	68-100
Na+ (mmol/L)*	138,2	5,4	127-155
K+ (mmol/L)	3,8	0,8	2,3-6,7
Ca++ (mmol/L)	1,18	0,09	0,55-1,35
Cl- (mmol/L)	107	9	96-131
Glu (mg/dL)	150	76	74-700
Lac (mg/dL)	19,5	11.1	10-55,6
pO2(T)/FiO2,r (mmHg)	225,5	164	48-566
pO2(T),r (mmHg)	66	29	29-170
AnGap,r (mmol/L)	10	6	1-34,1
mOsm,r (mOsm/L)	282,9	12,3	260,2-321,5

\* Mean and standard deviation were used. IQR: Interquartile range.

Arterial blood gas analysis is very relevant when caring for COVID-19 patients, priority should be given to this analysis to be able to observe the evolution of oxygen saturation that people with moderate or severe symptoms of COVID-19 have, since it is vital in these cases is to keep the patient's oxygenation levels stable and avoid more deaths.

In conclusion, the arterial gas values of patients with COVID-19 were determined and we found that the median for the partial pressure of oxygen (pO2) was 67 mmHg while for pCO2 it was 34.8 mmHg. The main limitations of the study was the small sample that was taken, and the type of oxygen therapy that the

patients had could not be differentiated, this would have been essential to see how the patients evolved with the oxygen supplied. No further data could be collected with which important correlations could be found.

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