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Serum interleukin-6 and zinc levels are associated with severity in COVID-19 patients from Lima, Peru

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BACKGROUND

The individual's immune system can determine the progress of SARS-CoV2 infection and lethality. The modulation of the inflammatory response through various molecules, such as cytokines and trace elements, is crucial during the disease. In this context, the objective of the present study was to determine the serum levels of IL-6 and zinc and their association with the severity of the disease in patients with COVID-19 from Lima, Peru.

METHODS

The A cross-sectional observational study was carried out in two health facilities during the 2021. Patients were divided into 4 groups according to the level of hospital care and severity of illness. The group of hospitalized patients in the intensive care unit, hospitalized patients who did not require an intensive care unit, the group of COVID-19 patients who did not require hospitalization, and a control group of healthy individuals. Serum samples were obtained from participants to determine IL-6 and zinc levels

RESULTS

The 64.8% of the patients evaluated were male. Patients hospitalized in the ICU were 11.25 times more likely to have cough and 36.7 times more likely to have fever compared to the control group. In the group of hospitalized patients who did not require ICU, the presence of cough was 9.44 times higher than in the control group. The lowest IL-6 values were obtained in the group of COVID-19 patients who did not require hospitalization (2 pg/mL) and the highest in the ICU group (168.5 pg/mL). On the other hand, the highest values of the micronutrient zinc were also obtained in the ICU group (3402.5 µg/dL). In this group, the highest values of Lymphocytes, C-reactive protein and lactate dehydrogenase were also found with statistical significance compared to the group of hospitalized patients who did not require ICU.

Table 1. Clinical symptoms and comorbidities of patients.

Characteristics	Hospitalized		Not hospitalized	Control group (n=12	*p*-value*
	SARS⁺ & ICU (n=26)	SARS⁺ & non-ICU (n=26)	SARS⁺ Outpatient (n=24)		
Symptoms at onset					
Cough	**18 (69.2)** ∞	**17 (65.3)** ∞	5 (20.8)	2 (16.7)	0.000
Expectoration	2 (7.6)	3 (11.5)	0 (0.0)	0 (0)	0.258
Fever	**20 (76.9)** ∞	11 (42.3)	6 (25)	1 (8.3)	0.000
Dyspnea	9 (34.6)	21 (80.7)	0 (0)	0 (0.0)	0.000
Fatigue	12 (46.1)	13 (50.0)	2 (8.33)	0 (0.0)	0.000
Anosmia	0 (0.0)	2 (7.6)	0 (0.0)	0 (0.0)	0.181
Diarrhea	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	-
Nausea/Vomiting	0 (0.0)	2 (7.7)	0 (0.0)	0 (0.0)	0.181
Headaches	3 (11.5)	3 (11.5)	8 (33.33)	2 (16.7)	0.153
Odynophagia	5 (19.2)	3 (11.5)	1(4.1)	0 (0.0)	0.197
Comorbidities					
Diabetes	7 (26.9)	6 (23.0)	1 (4.1)	0 (0.0)	0.044
Hypertension	6 (23.0)	6 (23.0)	0 (0.0)	0 (0.0)	0.022
Obesity	9 (34.6)	3 (11.5)	0 (0.0)	0 (0.0)	0.001
Asthma	0 (0)	2 (7.6)	0 (0.0)	0 (0.0)	0.181
Coronary disease	1 (3.8)	3 (11.5)	0 (0.0)	0 (0.0)	0.197
Neoplasia	0 (9.0)	1 (3.8)	0 (0.0)	0 (0.0)	0.491
Chronic kidney disease	1 (3.8)	0 (0.0)	0 (0.0)	0 (0.0)	0.491
Others	5 (19.2)	6 (23.0)	0 (0.0)	0 (0.0)	0.031

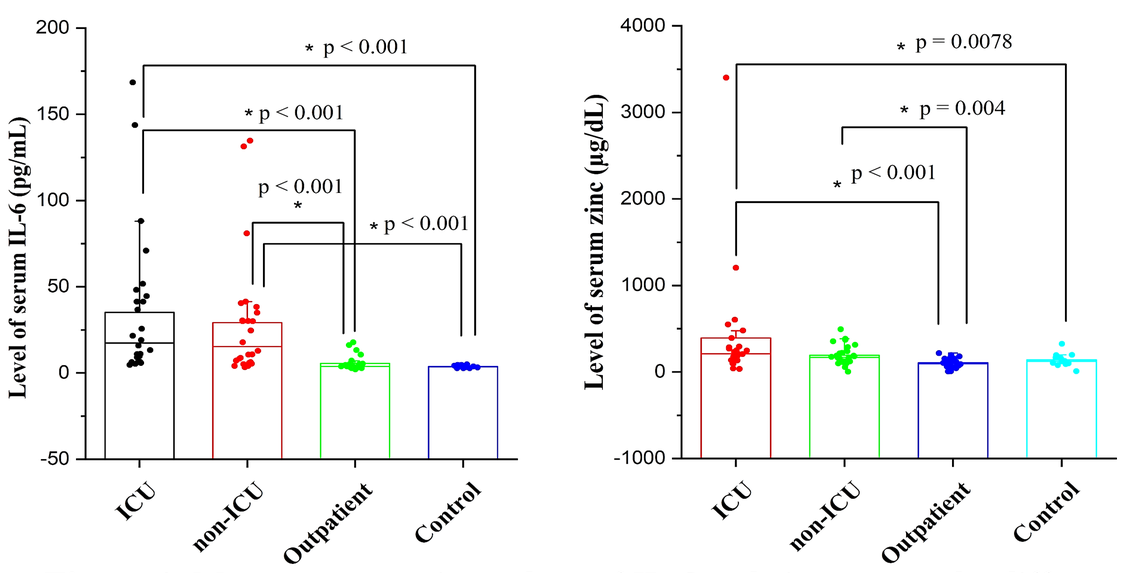

Figure 1. Mean concentration values of IL-6 and zinc among the different groups of patients.

Table 2. Descriptive statistics for IL-6 and zinc in the study population

Parameter		Hospitalized		Not hospitalized	Control group (n=12)	*p*-value*
		SARS⁺ & ICU (n=26)	SARS⁺ & non-ICU (n=26)	SARS⁺ Outpatient (n=24)		
IL-6 (pg/mL)	Mean ± SD	35.2 ± 41.9	29.1 ± 35.3	5.7 ± 4.3	3.7 ± 0.8	0.0001
	max	168.5	134.6	17.7	4.9	
	min	4.7	3.3	2	2.7	
	IQR	35.6	28.6	2.1	1.45	
Zinc (µg/dL)	Mean ± SD	392.5 ± 657.6	200.6 ± 106.2	105.3 ± 57.6	138.8 ± 79.0	0.0001
	max	3402.5	491.8	218.1	324.0	
	min	32.7	53.3	6.2	9.1	
	IQR	129.5	117.7	88.3	86.8	

Table 3. Hematological and biochemical parameters of the groups of patients who required hospitalization

Hematological and biochemical parameters	SARS-CoV-2 positive ICU Mean ± SD	SARS-CoV-2 positive Non-ICU Mean ± SD	p-value*
Hemoglobin (g/dL)	14.65 ± 1.43	14.60 ± 1.87	
Leukocytes (/mm³)	11.00 ± 3.90	11.39 ± 4.57	
Lymphocytes (/µL)	789.62 ± 523.50	888.30 ± 849.41	p < 0,05
Platelets (10^9/L)	328.81 ± 118.20	271.78 ± 119.80	
Glutamic-pyruvic transaminase (U/L)	100.96 ± 95.04	81.67 ± 53.26	
Creatinine (mg/dL)	1.11 ± 1.75	0.70 ± 0.18	
C-reactive protein (mg/L)	157.99 ± 124.49	213.32 ± 130.01	p < 0,05
Lactate dehydrogenase (UI/L)	304.62 ± 105.06	404.52 ± 133.21	p < 0,05
Procalcitonin (ng/mL)	0.32 ± 0.53	0.40 ± 0.51	
D-dimer (mg/L)	0.81 ± 0.91	0.96 ± 0.54	
Ferritin (ng/mL)	1232.62 ± 801.06	1303.97 ± 686.56	
Prothrombin time (s)	11.11 ± 1.51	11.45 ± 1.38	

CONCLUSION

Patients hospitalized in the ICU had higher mean levels of IL-6 and zinc compared to the other virus-infected groups and the control group. In this group, the highest values of Lymphocytes, C-reactive protein and lactate dehydrogenase were also found with statistical significance compared to the group of hospitalized patients who did not require ICU.

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