



IRAQI
Academic Scientific Journals



العراقية
المجلات الأكاديمية العلمية

ISSN:1813-1638

The Medical Journal of Tikrit University

Journal Homepage: <http://mjtu.tu.edu.iq>

MJTU

The Medical Journal
of Tikrit University

The Relationship of serum d-dimer and IL-6 with Oxygen Saturation and severity of infection in patients affected with COVID-19

A1 Sura S. Abdulazeez, B2 Abdulhadi M. Jumaa, and C3 Sarah M. Mahmoud

¹ College Of Nursing, Tikrit University, Tikrit, Iraq

²College Of Pharmacy, Mustansiriyah University, Baghdad, Iraq

*Corresponding author: E-mail: Abdulhadi.m@tu.edu.iq

Received: 00/00/2024
Revising: 00/00/2024
Proofreading: 00/00/2024
Accepted: 00/00/2024
Available:online:31/12/2024

KEY WORDS:
COVID-19, Iraq, SPO2, CRP,
IL-6, D-dimer.

ABSTRACT

Introduction: In December 2019, the emergence of a novel coronavirus-induced pneumonia in Wuhan, China, posed a serious and urgent threat to public health worldwide. The study aims to find a relationship between serum d-dimer and IL-6 and oxygen saturation and severity of infection in patients affected by COVID-19. **Patients and methods:** Ninety people participated in the present study: sixty patients and thirty healthy subjects. Patients refused to take the COVID-19 vaccination, while the control subjects were vaccinated against COVID-19. The study was done from the first of January 2022 to the end of March 2022. COVID-19 was diagnosed by using reverse-transcription polymerase chain reaction (RT-PCR), most commonly collected from nasopharyngeal (NP) swabs. Blood samples were obtained from the patients and people who were apparently healthy as control subjects. White blood cell count, CRP, ferritin, IL-6, and D dimer were measured. **Results:** There was an increase in the number of WBCs in COVID-19 patients, as compared with control healthy subjects, ($p \leq 0.01$). Also, there was an increase in the concentration of serum ferritin in COVID-19 patients, as compared with control healthy subjects ($p \leq 0.01$). However, in the present study, there is a significant decrease in the SPO2 % in COVID-19 patients, as compared with control healthy subjects, ($p \leq 0.01$). Also, there was an elevation in the concentration of IL-6 and D dimer in COVID-19 patients, as compared with control healthy subjects ($p \leq 0.01$). There was significant negative correlation between SpO2% and serum levels of (ferritin, $r = -0.5$, $p < 0.01$; CRP, $r = -0.68$, $p < 0.01$; IL-6, $r = -0.6$, $p < 0.01$; and D-dimer, $r = -0.78$, $p < 0.01$).

DOI: <http://doi.org/10.25130/mjotu.00.00.00>



© 2024. This is an open access article under the CC by licenses <http://creativecommons.org/licenses/by/4.0>

INTRODUCTION

COVID-19 is an abbreviation of a disease that emerged in 2019 in the east of Asia and became a pandemic in 2020 [1]. The COVID-19 virus is transmitted through direct or indirect contact as people breathe in contaminated air with droplets, aerosols, or small airborne particles of an infected person by breathing, talking, coughing, and sneezing [1, 2, 3].

The common symptoms of COVID-19 are dry cough, fever and Fatigue. Other symptoms that are less common and may affect some patients include Loss of taste or smell nasal congestion, conjunctivitis, Sore throat, Nausea, diarrhoea and Chills [5].

MATERIAL

Ninety people were involved in the present study, (60 patients and 30 healthy people). Patients refused to take the COVID-19 vaccination, while the control subjects took 2 vaccinations. This study was carried out from the first of January 2022 to the end of March 2022. Using a questionnaire form that the investigator created, an interview with these patients took place COVID-19 was diagnosed by using reverse-transcription polymerase chain reaction (rt-PCR), most commonly collected from nasopharyngeal (NP) swabs [6].

The researcher conducted a face-to-face interview to collect all data. Venous blood was obtained from each participant. Blood samples were obtained from the patients and controls. The blood sample obtained from each subject was transferred into a gel tube for separation of serum.

Exclusion criteria included

- 1) patients with thyroid, parathyroidism, and DM diseases
- 2) patients with autoimmune disease, liver disease, and renal disease.
- 3) patient with liver, kidney and pancreas problems.

White blood cell count, Serum ferritin, (In vitro test for the quantitative determination of ferritin in human serum and plasma on Roche/Hitachi cobas c 311/501 systems.).

There was an immunoturbidimetric assay used to measure CRP in human serum and plasma in a lab setting on a Cobas C 311. While IL-6 was measured by standard procedures or by ELISA kits, Kit utilises the Double Antibody Sandwich ELISA technique.

The Roche/Hitachi Cobas C 311/501 systems were used for an in vitro test to measure the amount of D-Dimer and

X-oligomers, which are breakdown products of fibrin, in human plasma. All kits are from Roche/Germany [7].

Pulse oximetry, a non-invasive technique for keeping track of a person's blood oxygen saturation, measured SPO₂. Peripheral oxygen saturation (SpO₂) readings are typically within 2% accuracy.

RESULTS

The mean and standard deviation of the age of normal healthy control and COVID-19 patients are as follows;

Group 1 (Covid 19)= 56.8 ± 11.7 years.

b-Group 2 (Control healthy subjects) = 52.1 ± 8 years.

In the present, Table 1 shows the result of white blood cells (WBCs), There is a significant increase in the white blood cell number (WBCs) in COVID-19 patients, as compared with control healthy subjects, (p≤ 0.01).

Table-1: show the mean and standard deviation of WBCs, serum ferritin and SPO₂.

Parameters	Patients (60)	Controls (30)	P value
WBCs (10 ⁹ /L)	15.5 ± 4.1	8.5 ± 3.2	0.01
Ferritin (ng/ml)	889.5 ± 275	64.2 ± 13	0.01
SPO ₂ %	76.9 ± 9.8	99 ± 0.5	0.01

Also, there is a significant increase in the concentration of serum ferritin in COVID-19 patients, as compared with control healthy subjects, (p≤ 0.01). However, (Table 1) shows the result SPO₂ there is a significant decrease in the SPO₂ % in COVID-19 patients, as compared with control healthy subjects, (p≤ 0.01). In the present,

(Table 2) there is a significant elevation in the concentration of CRP in COVID-19 patients, as compared with control healthy subjects, (p≤ 0.01). Also, there is a significant elevation in the concentration of IL-6 in COVID-19 patients, as compared with control healthy subjects, (p≤ 0.01).

Table-2: show the mean and standard deviation of CRP, IL-6 and D-Dimer

Parameters	Patients (60)	Controls (30)	P value
CRP (mg/dl)	147.3 ± 16.5	5.1 ± 1.2	0.01
IL-6 (ng/l)	266,5 ± 85	110.5 ± 15.6	0.01
D Dimer (ng/ml)	5857.9 ± 1011	121.9 ± 47	0.01

Moreover, there is a significant elevation in the concentration of D-Dimer in COVID-19 patients, as compared with control healthy subjects, ($p \leq 0.01$). As shown in (table 2).

In the present study, there is a significant negative correlation between SpO₂% and serum levels of ferritin, $r = -0.5$, $p < 0.01$; and IL-6, $r = -0.6$, $p < 0.01$.

DISCUSSION

In the present, **Table 1** shows the result of white blood cells (WBCs), there is a significant elevation in the number of WBCs in COVID-19 patients, as compared with control healthy subjects, ($p \leq 0.01$). This result agrees with previous findings,[8,9]. In the present study, there was an increase in serum ferritin in covid 10 patients. A previous study stated that serum ferritin has been linked to poor recovery in COVID-19 patients,[10].

However, the present study, finds that result of SPO₂ in Covid 19 patients is a significant decrease in the SPO₂ % in COVID-19 patients, as compared with control healthy

subjects, ($p \leq 0.01$). The present study agrees with previous studies,[11,12]. In the present study, there was a significant elevation in the concentration of CRP and IL-6 in COVID-19 patients, as compared with control healthy subjects, ($p \leq 0.01$). These findings agree with previous results, [11,13]. Moreover, there is a significant elevation in the concentration of D-Dimer in COVID-19 patients, as compared with control healthy subjects, ($p \leq 0.01$). This finding agrees with a previous study, [14]. For patients with COVID-19, pulse oximetry helps with early detection of silent hypoxia, in which the patients still look and feel comfortable, but their SpO₂ is dangerously low. This happens to patients either in the hospital or at home. Low SpO₂ may indicate severe COVID-19-related pneumonia, requiring a ventilator, [15]. The present study **concluded** that there was a significant negative correlation between SpO₂% and serum levels of (ferritin, $r = -0.5$, $p < 0.01$; CRP, $r = -0.68$, $p < 0.01$; IL-6, $r = -0.6$). The present study **recommends** that measurement extend to IL₁₀,

IL-17A and spirometric measurement. Also, investigate for other PCR testing after vaccination.

CONCLUSION

The present study **concluded** that there was a significant negative correlation between SpO₂% and serum levels of (ferritin, $r = -0.5$, $p < 0.01$; CRP, $r = -0.68$, $p < 0.01$; IL-6, $r = -0.6$).

REFERENCES

- 1-Singhal T. A review of coronavirus disease-2019 (COVID-19). The Indian J. of paediatrics. 2020 Apr;87(4):281-6.
- 2-Rothan HA, Byrareddy SN. The epidemiology and pathogenesis of coronavirus disease (COVID-19) outbreak. J. of autoimmunity. 2020 May 1; 109:102433.
- 3-Gupta A, Madhavan MV, Sehgal K, *et al.* Extrapulmonary manifestations of COVID-19. Nature medicine. 2020 Jul;26(7):1017-32.
- 4-Nile SH, Nile A, Qiu J, Li L, Jia X, Kai G. COVID-19: Pathogenesis, cytokine storm and therapeutic potential of interferons. Cytokine & growth factor reviews. 2020; 1; 53:66-70.
- 5-Grant MC, Geoghegan L, Arbyn M, *et al.* The prevalence of symptoms in 24,410 adults infected by the novel coronavirus (SARS-CoV-2; COVID-19): A systematic review and meta-analysis of 148 studies from 9 countries. PloS one. 2020; 23;15(6): e0234765.
- 6-Long C, Xu H, Shen Q, *et al.* Diagnosis of the Coronavirus disease (COVID-19): rRT-PCR or CT? Euro J. of Radiology. 2020; 1; 126:108961.
- 7-Dempfle CE, Hafner G, Lestin HG, Töpfer G, Adema E, Hubbuch A. Multizentrische Evaluierung von Tina-quant® a D-Dimer. Laboratoriums Medicine. Journal of Laboratory Medicine.. 1996; 1;20(1): 31-7.
- 8-Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y., *et al.* (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet. 395, 497–506.
- 9-Wang, D., Hu, B., Hu, C., Zhu, F., Liu, X., Zhang, J., *et al.*(2020). Clinical Characteristics of 138 Hospitalized Patients with 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, China. JAMA. 323, 1061–1069.
- 10-Zhou B, She J, Wang Y, Ma X. Utility of ferritin, procalcitonin, and C-reactive protein in severe patients with

- 2019 novel coronavirus disease.2020
- 11-Amal F. Gharib 1, Ahmad El Askary 1, Asmaa F. Hassan, *et al.* Profiling Inflammatory Cytokines in Cohort Study of Egyptian Patients with COVID-19 Infection. *Clin. Lab.* 2021; 67:1492-1500.
- 12-Goyal P, Choi JJ, Pinheiro LC, *et al.* Clinical Characteristics of COVID-19 in New York City. *N Engl J Med.* 2020; 11; 382(24): 2372-4.
- 13Mooiweer, EB. Luijk, M.J. Bon ten, M.B. Ekkelenkamp. C-Reactive protein levels but not CRP dynamics predict mortality in patients with pneumococcal pneumonia, *J. Infect.*, 62 (2011), pp. 314-316,
- 14-Ceriello A. Diabetes, D-dimer and COVID-19: the possible role of glucose control. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews.* 2020;14(6). 1016-21.
- 15-Maisel WH, Lewis RJ. "Noninvasive measurement of carboxyhemoglobin: how accurate is accurate enough?". *Annals of Emergency Medicine.* **2010**; **56** (4): 389