

Biochemical and hematological parameters as a predictor for COVID -19 infection in 65 patients diagnosed by real time –PCR in Kirkuk city

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ABSTRACT

Background: Covid-19 manifest multisystemic disease affect respiratory, gastrointestinal trac, nervous systems as well as other body systems. biochemical parameters can help in diagnosis and follow up.

Methods:130 patients were enrolled in the study ,65 patients of them diagnosed as having COVID-19 infection and other 65 participant were normal ,blood drawn from all of them and CBC,LDH,D-dimer,CRP and ferritin were measured.

Results: 65 patients with positive PCR covid -19 infection with mean age (44.2±13.1) and 65 participant as control with negative RT-PCR with mean age (41.6±14.9).patients showing significant decrease in total Wbc count and Lymphocytes (P-value:0.0001,0.0001),and significant rise of LDH,D-Dimer ,CRP and Ferritin levels (P-value:0.004,0.002,0.001,0.0001)

Conclusion: biochemical parameters can be used as a predictor of COVID-19 infections rather than RT-PCR test or strengthen its results.

Keywords: COVID-19, Ferritin, LDH, CBC.

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INTRODUCTION

In 2109 a new strain of corona viruses other than SARS and MERS characterized by highly infectivity and severe symptoms and higher death rate (1) more than 185 countries recorded infections with COVID 19 virus beginning from Wuhan in china and spread to most of parts all over the world(2).

Broad spectrum of signs and symptoms and systems affected seen in different cases affected with this type of virus. fever which almost around (38-39 C), cough, pneumonia, dyspnea and severe fatigue (3). Other systems like

cardiovascular ,Gastrointestinal ,neurological and other systems could be affected with this disease(4).laboratory findings showed that the patients with COVID 19 infection shows low Wbc count with lymphopenia, high level of LDH,D-Dimer, high S.Ferritin and C-reactive protein ,some studies shows high level of IL6,glucose level and ALT,AST levels also recorded high in other studies. (5,6)

Many published studies concentrate on symptoms and epidemiology and mortality rates of the disease but the articles that discuss laboratory parameters specific for COVID 19 infections is limited. (7,8)

This study aimed to compare the levels of laboratory parameters like LDH, D-Dimer,S.Ferritin and C-reactive protein as indicator of COVID 19 infection other than PCR.

Patients and Methods

A case control study contains 65 patients with symptoms of fever, cough, fatigue and headache. all of them were diagnosed as having positive COVID 19 infection with pharyngeal swab which is positive by RT-PCR and blood sample collected and 65 another participant with no symptoms were collected from patients attended Al-mashriq Medical Lab in Kirkuk City in Iraq,informed consent was taken from all patient ,CBC done with serum LDH,S.Ferritin ,D-Dimer and C-reactive protein all of them done by AFLO smart 900 biochemical autoanalyzer and mindray hematology analyzer .

Results

130 patients enrolled in the study 65 patients of them were RT-PCR positive for COVID-19 infections 67.7% of them were males and 32.3% of them were females their mean age ±SD were (44.2±13.1) compared with 65 patients with RT-PCR negative males , comprises 60% of them and 40% of them were females with no significant correlation regarding both gender and age between 2 study groups (Table 1) .

Table 2 shows that patients with positive RT-PCR had significant decrement in total Wbc count in correlation to those patients with negative RT-PCR for COVID 19 (p-value :0.0001).also patients with confirmed COVID-19 infection has low percentage of lymphocytes Wbc as regard to those with negative test recorded as significant correlation (p-value :0.0001) also patients with COVID - 19 infection shows significant raise of LDH,D-Dimer ,CRP and Ferritin Level (P-value :0.004,0.002,0.001,0.0001).

Table 1. demographic characteristics of the 2 study groups

	Positive RT-PCR N=65	Negative RT-PCR N=65	P value
Gender (M/F)	(44/21) (67.7%/32.3%)	(39/26) (60%/40%)	0.08
Age ±SD	44.2±13.1	41.6±14.9	0.10

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Table 2. comparison between biochemical parameters in patients with Positive and Negative RT-PCR test for COVID -19 infection

Parameters	Positive PCR (n=65)	Negative PCR(n=65)	p-value
Wbc (cell/mm³)	3040±1000	6052±1100	0.0001
Lymphocytes (%)	23.6	47.5	0.0001
LDH (U/L)	534.4±101.3	213.6±112.2	0.004
D-Dimer (ng/ml)	822.4±115	314.5±104	0.002
CRP (mg/dl)	65±15.4	4.5±2.3	0.001
Ferritin (ng/ml)	986±126.4	178±105	0.0001

Discussion

Current study findings give good support to the accuracy of depending on biochemical parameters for diagnosis of patients with COVID-19 infection. Since sometimes because of unavailability of PCR test or its high cost so we can depend on some biochemical parameters like WBC count and Lymphocytes percentage, LDH, D-Dimer, C-reactive protein and Ferritin. All of these parameters seems to be significantly high in COVID -19 infection (9) .

Current study shows that those patients with confirmed RT-PCR positive for COVID-19 infection had low total count of white blood cells with lymphopenia with significant correlation. These results were concordant with other study done by Rong et al which showed the same results (10). Other laboratory results shows low leucocytes count and most of them was neutrophils with low lymphocytes count (11) .

Most of patients with Corona virus infection in this study shows high significant level of serum Lactate dehydrogenase. These findings were similar to an article done by Chen et al study done on 99 patients in Wuhan city shows that those patients had abnormal LDH (12) while a study done in Saudi Arabia by Alghamdi et al in 2016 on MERS-COV also shows high level of LDH (6).

Current study shows high significant levels of C-reactive protein, D-Dimer and serum ferritin those results are similar to many studies shows the same result (13,14,15,16) . The high level of these markers is related to them being as acute phase reactant markers. Another study done by Huang et al published in July 2020 shows that high level of these markers are associated with poor outcome of patients with COVID-19 infection (17).

Conclusion

Low WBC counts and low Lymphocytes count, with high level of LDH, CRP, D-Dimer and Serum ferritin can be used as predictors of COVID -19 infection in absence of RT-PCR test.

REFERENCES

1. Organization WH. Clinical management of severe acute respiratory infection (SARI) when COVID-19 disease is suspected: interim guidance, 13 March 2020. World Health Organization; 2020.
2. Guan W-j, Ni Z-y, Hu Y, Liang W-h, Ou C-q, He J-x, et al. Clinical characteristics of coronavirus disease 2019 in China. *New England Journal of Medicine*. 2020
3. Ai T, Yang Z, Hou H, Zhan C, Chen C, Lv W, et al. Correlation of Chest CT and RT-PCR Testing in Coronavirus Disease 2019 (COVID-19) in China: A Report of 1014 Cases. *Radiology*. 2020:200642
4. Gao Y, Li T, Han M, Li X, Wu D, Xu Y, et al. Diagnostic Utility of Clinical Laboratory Data Determinations for

Patients with the Severe COVID-19. *Journal of Medical Virology*. 2020

5. Fan BE, Chong VCL, Chan SSW, Lim GH, Lim KGE, Tan GB, et al. Hematologic parameters in patients with COVID-19 infection. *American Journal of Hematology*. 2020
6. Al Ghamdi M, Alghamdi KM, Ghandoori Y, Alzahrani A, Salah F, Alsulami A, et al. Treatment outcomes for patients with Middle Eastern Respiratory Syndrome Coronavirus (MERS CoV) infection at a coronavirus referral center in the Kingdom of Saudi Arabia. *BMC infectious diseases*. 2016;16(1):174.
7. Wang J-T, Sheng W-H, Fang C-T, Chen Y-C, Wang J-L, Yu C-J, et al. Clinical manifestations, laboratory findings, and treatment outcomes of SARS patients. *Emerging infectious diseases*. 2004;10(5):818.
8. Rodríguez-Morales AJ, Cardona-Ospina JA, Gutiérrez-Ocampo E, Villamizar-Peña R, Holguin-Rivera Y, Escalera-Antezana JP, et al. Clinical, laboratory and imaging features of COVID-19: A systematic review and meta-analysis. *Travel Medicine and Infectious Disease*. 2020:101623.
9. Yang X, Yu Y, Xu J, Shu H, Liu H, Wu Y, et al. Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study. *The Lancet Respiratory Medicine*. :2020.
10. Qu R, Ling Y, Zhang Yh, Wei Ly, Chen X, Li X, et al. Platelet-to-lymphocyte ratio is associated with prognosis in patients with Corona Virus Disease-19. *Journal of Medical Virology*. 2020
11. Lei J, Li J, Li X, Qi X. CT imaging of the 2019 novel coronavirus (2019-nCoV) pneumonia. *Radiology*. 2020:200236.
12. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *The Lancet*. 2020;395(10223):507-13.
13. Wan, S, Xiang, Y, Fang, W, et al. Clinical features and treatment of COVID-19 patients in Northeast Chongqing. *J Med Virol* 2020; 0-1.
14. Zhang, G, Hu, C, Luo, L, et al. Clinical features and outcomes of 221 patients with COVID-19 in Wuhan, China. *medRxiv* 2020; 2020.03.02.20030452.
15. Zhao, W, Yu, S, Zha, X, et al. Clinical characteristics and durations of hospitalized patients with COVID-19 in Beijing: a retrospective cohort study. *medRxiv* 2020; 21: 1-9.
16. Zhang, J-J, Dong, X, Cao, Y-Y, et al. Clinical characteristics of 140 patients infected with SARS-CoV-2 in Wuhan, China. *Allergy Eur J Allergy Clin Immunol* 2020; 1-12.

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17. Tabata, S, Imai, K, Kawano, S, et al. Non-severe vs severe symptomatic COVID-19: 104 cases from the outbreak on the cruise ship "Diamond Princess" in Japan. medRxiv. Epub ahead of print 2020.