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Evaluation of Liver Function in patients with Corona virus infection

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Abstract

The study was conducted on 65 samples, 40 samples from patients with corona virus infection and 30 samples from the control group and their ages ranged between (35-55) years and the samples were collected for one year and the samples were collected from Samarra General Hospital(isolation unit), outpatient medical clinics, as well as centers for sonar and spiral units from the period. After that, blood was collected from patients and healthy people and separated by centrifugation. The Variables were measured, including (CRP, AST, ALT, ALP).

The results of the current research showed a significant elevated in each of the levels (CRP, AST, ALT,ALP), in the patients with COVID-19 compered a control .

Key words / COVID-19, C-Reactive protein , Liver function

Introduction

The emerging corona virus, or the so-called COVID-19, is an infectious disease, which was recently classified as a pandemic at the present time, and is considered one of the most active known viruses and the most dangerous in terms of the speed of spread and its impact on human life [(1)].

Since the virus is considered a coronavirus, it takes a shape resembling a crown or a halo, and this shape refers to the distinctive appearance of virions (the infective form of the virus that appears through an electron microscope, as it has villi of large surface protrusions, which shows it in the form of a king's crown or a halo [(2)] Therefore, several proteins contribute to the overall structure of all coronaviruses, namely the spike (S), the envelope (E), and the membrane (M) and the nucleocapsid (N) [(3).]

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The clinical symptoms of the COVID-19 virus varied from mild cases to severe cases and even death as a result of respiratory failure [4]. The latest statistics of the International Federation of Severe Acute Respiratory Infections and Emerging Diseases reported 25,849 cases in a British hospital of COVID-19-19 through clinical examination of patients. The five most common symptoms at admission to healthcare facilities were fever, shortness of breath, cough, fatigue and malaise [5]. So too are myocardial injury, arrhythmias and cardiomyopathies, and heart failure [6] and acute kidney injury often requiring renal replacement therapy [7,8] and neurological complications such as encephalopathy [9], and acute ischemic stroke.

It was found that infection with the corona virus is related to liver functions, as liver dysfunction may occur when infected with COVID-19 and does not refer to the direct cytopathic effects of the virus, but rather to general stress due to the multi-organic nature of the infection, which is accompanied by immune injury, systemic inflammatory response syndrome Inflammatory Response Syndrome (SIRS) and the turbulent release of cytokines that can cause liver injury per se (10,11). One pathway of liver damage may be a cytokine storm resulting from an excessive immune response induced by the virus [12]. However, ALT, AST, total bilirubin, and other liver function indicators were found to be significantly increased in patients with severe symptoms of COVID-19 infection compared to patients with mild symptoms [13].

CRP is a non-specific inflammatory protein in the acute phase and its concentration increases in response to tissue injury, inflammation and infection [14,15]. It is a protein produced by the liver and serves as an early indicator of infection and inflammation [16]. Its normal concentration in the blood is less than (10 mg/L), as this percentage rises rapidly within hours and gives the highest peak in 48 hours from the onset of the disease [17].

Material and Methods

Study Samples:

The study was conducted on (65) blood samples, which were divided into:

1- patient group :- It contains (40) blood samples for patients infected with Corona virus.

2- control group:- It contains (25) samples of healthy people.

The ages of the two groups ranged between (35-55) years, as the samples were collected from Samarra General Hospital(isolation unit), outpatient medical clinics, as well as centers for sonar and spiral units from the period.

Estimation of CRP level in blood serum

The CRP was estimation by using the VEDA.LAB device for the purpose of measuring based on the method [18].

Estimation of (AST), (ALT, and (ALP) enzyme activity in blood serum

The activity of the enzyme aspartate amino transferase (AST) and the activity of the enzyme alanine transferase (ALT) in blood serum were estimated using the ready-made analysis kit prepared from the French company Randox [19], as well as the activity of the

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alkaline phosphatase enzyme in blood serum depending on the colorimetric method and according to the prepared analysis kit Made by the French company Biolabo according to the ready-made measuring kit from the linear company [20].

Statistical Analysis

The SPSS statistical program was used to analyze the obtained results, if the mean and the standard deviation ± SD were used for the data under study. The T-test was also used to compare the biochemical variables between the two groups of patients and the control at a probability level ($P \leq 0.05$).

Result and Desiccation

Measuring the levels of biochemical variables for the samples under study:

Table (1) shows the mean ± standard deviation of biochemical variables for the samples under study.

Groups / Parameters	Mean ± SD		
	Control	**Patinas**	**P value**
CRP (mg/L)	4.1±1.7	36.774±13.516	0.01*
AST(U/L)	14.4±4.543	35.129±12.296	0.01*
ALT(U/L)	14.85±4.798	21±7.474	0.01*
ALP (U/L)	40.03±11.913	119.159±33.299	0.01*

$p \leq 0.05$

The results showed a significant elevated at $p \leq 0.05$ probability level in the level of the biochemical variables represented (CRP, AST, ALT ,ALP) in the sera of patients with COVID-19 compared to healthy people, as in the figures (1, 2, 3, 4) respectively.

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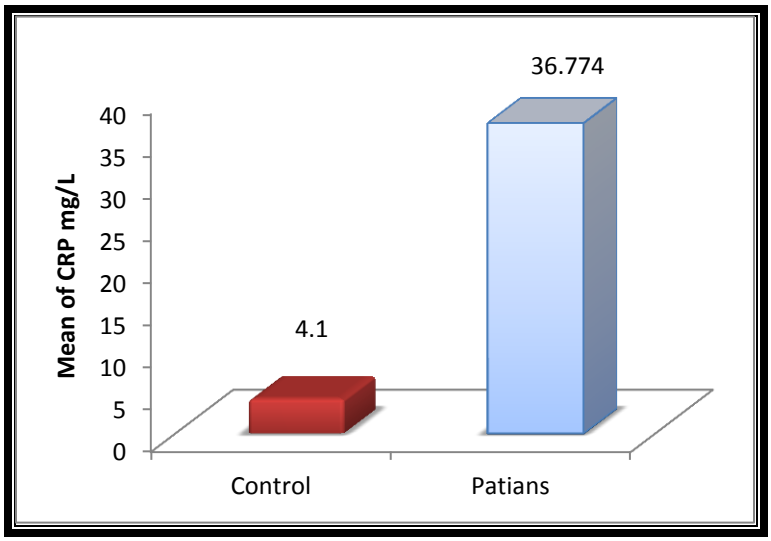

Fig 1 :- The level of CRP in all groups

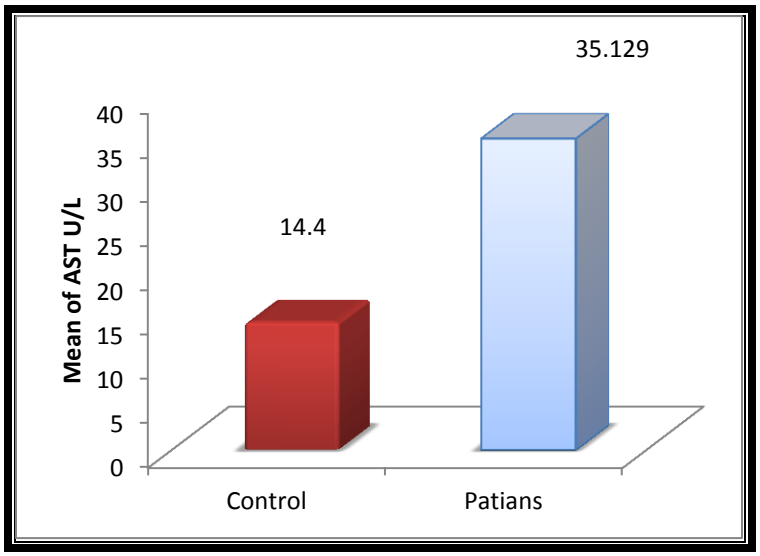

Fig 2 :- The activity of AST enzyme in all groups

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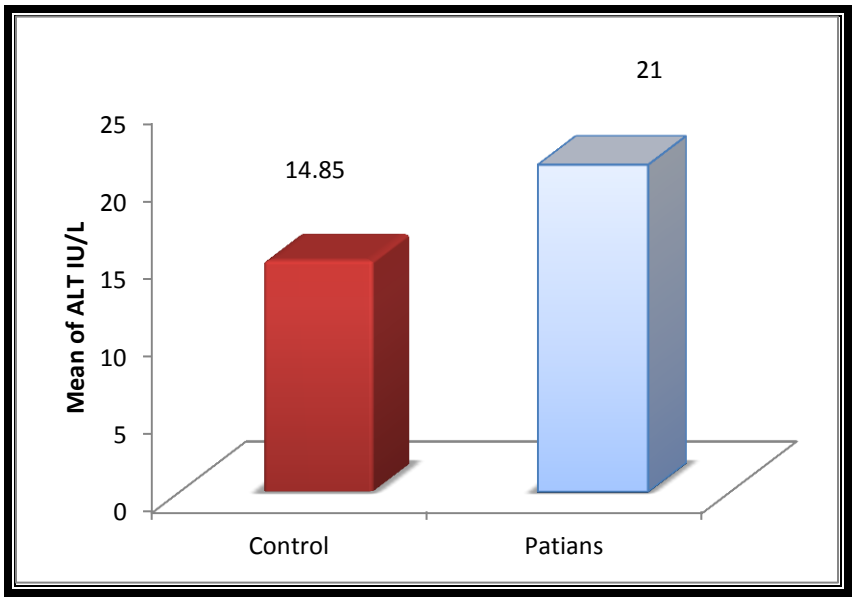

Fig 3 :- The activity of ALT enzyme in all groups

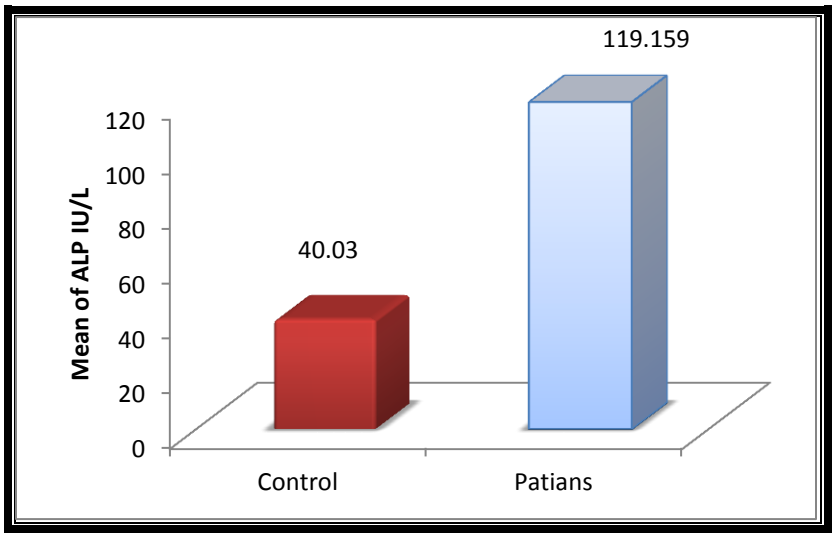

Fig 4 :- The activity of ALP enzyme in all groups

Dissections

The results agreed with [22,21], who indicated in their study that the level of CRP is significantly related to the severity of Covid-19, so this represents early detection of the severity of the disease.

Since the Covid-19 virus is considered one of the diseases of the acute respiratory syndrome, as it was found that the level of CRP reflects the resulting changes in the severity of the inflammatory response when strong inflammation appears [23,24] and that

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CRP is an independent variable associated with the severity of the disease and in various cases, including acute and critical [23] .

Studies have confirmed that there is a significant correlation between C-reactive protein concentrations and the worsening of the condition of patients with coronavirus [25]. It was also found that patients with low blood oxygen levels (less than 90%) have high levels of C-reactive protein compared to patients with CRP. Increase the percentage of oxygen in their blood (more than 90%). As high levels of C-reactive protein lead to lung damage in people infected with the Covid-19 virus, this is a clear sign in assessing the cases of patients infected with the virus [26].

It is noted through the results that there is an increase in the effectiveness of liver enzymes as a result of infection with the virus, as it was found that the increase in the effectiveness of the enzymes AST and ALT is inferred by the presence of the effect of the Covid-19 virus on liver functions. Therefore, the results of the current study agreed with studies [27-30].

Hachim et al [31] found that the effectiveness of ALT and AST enzyme was higher in patients who needed to lie in the intensive care ward compared to those who did not need that. As for Jayasri [32], they indicated that the increase in ALT was an indicator of the need for hospitalization in the intensive care ward. Huarg [33] mentioned that both ALT and AST enzymes represent an indicator as a risk factor, as their levels increased in patients with high disease severity.

Cai [34] found that 76.3% of them had abnormal liver function tests, and that 21.5% of them had a kidney injury during their hospitalization. Whereas, during a period of two weeks, the level of ALT was abnormal at 23.4% and AST at 14.8%, and thus they concluded that patients who have abnormally high activity of ALT and AST are more likely to have severe disease severity. Thus, there is a need to monitor the levels of enzymes in the blood periodically to direct treatment to serve the patient's health condition.

Ghaith [29], in their study that included 160 patients with Covid-19, they found that 68% of patients had a high level of AST activity, while ALT activity was high in 34% of patients. Therefore, Hwaiz [35] found that most of the COVID-19 patients had abnormal liver enzyme activity, and this may be related to the multiplication of the virus in the liver, including alkaline phosphatase.

The reason for the relationship between liver function and infection with the Covid-19 virus may be attributed to the fact that the Covid-19 virus binds to the ACE2 chains displayed on the surface of hepatocytes dissected from the epithelial cells of the bile duct and directly seen by hepatocytes [36]. Or it may be that the cytokine storm that occurs after infection with Covid-19 leads to an increase in the secretion of inflammatory factors with a decrease in the numbers (CD8 +, CD 4 +) of T lymphocytes [37,38]. And because of bacterial contamination, it leads to high-level inflammatory responses, which in turn lead

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to disruption of the functions of multiple organs in the patient's body, including the liver [39.40].

References

1-Mahmmod,B. M. Dabdawb,M.A.A. The pandemic COVID-19. Infection spreading spatial Aspects; A Network. Based Softwar Approach. M.Raf.J.of.(.Comp.Maths; 2020:14.1

2-Kim, J. M., Chung, Y. S., Jo, H. J., Lee, N. J., Kim, M. S., Woo, S. H., et al. Identification of Coronavirus Isolated from a Patient in Korea with COVID-19. Osong Public Health and Research Perspectives; 2020 .11(1):3 .

3-Li F, Li W, Farzan M, Harrison SC (September 2005). "Structure of SARS coronavirus spike receptor-binding domain complexed with receptor". Science. 309 (5742): 1864–1868.

4-Phan T. Novel coronavirus: From discovery to clinical diagnostics. .Infect Gen Evol; 2020.79:104211

5-Docherty AB, Harrison EM, Green CA, et al. Features of 20 133 UK patients in hospital with COVID-19 using the ISARIC WHO Characterisation prospective Clinical Protocol: observational cohort study. bmj. 2020 May 22;369 .

6-Driggin, Elissa,. Cardiovascular considerations for patients, health care workers, and health systems during the pandemic." Journal American Cardiology 2352-2371. COVID-19 of College the of 2020 75.18.

7-Mustafa MA, AL-Samarraie MQ, Ahmed MT. Molecular techniques of viral diagnosis. Science Archives. 2020;1(3):89-92.

8-Batlle D, Soler MJ, Sparks MA, et al. Acute Kidney Injury in COVID19: Emerging Evidence of a Distinct Pathophysiology. Journal of the American Society of Nephrology. 2020: ASN 2020; 4(2), 11-20 .

9-Helms J, Kremer S, Merdji H, Clere-Jehl R, Schenck M, Kummerlen Features C. in Neurologic Severe SARS-CoV-2 Infection. New England Journal of Medicine 2020; 382(23), 2268-2270.

10-Jothimani D, Venugopal R, Abedin MF, Kaliamoorthy I, Rela M. covid-19 and the liver. J. Hepatol 2020; 73: 1231–1240.

11-Tian D, Ye Q. Hepatic complications of covid-19 and its treatment. J. Med. Virol 2020; 92: 1818–1824.

12-Benedé-Ubieto R, Estévez-Vázquez O, Flores-Perojo V, et al. Abnormal Liver Function Test in Patients Infected with Coronavirus (SARS-CoV-2): A Retrospective Single-Center Study from Spain. Journal of clinical medicine. 2021 Jan;10(5):1039.

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 03, 2023

13-Al-Samarrai MK, AL-Samarraie MQ, Alelyan UA. Estimation of white blood cells, hemoglobin and copper levels in bakery workers. Biochemical and Cellular Archives. 2019;19:2327-30.

14- Clyne B, Olshaker JS. The C-reactive protein. J Emerg Med 1999;17(6):1019–25
15- Gabay C, Kushner I. Acute-Phase Proteins and Other Systemic Responses to Inflammation [Internet]. New England Journal of Medicine. 1999;340(6):448–54
16- Marnell L, Mold C, Du Clos TW. C-reactive protein: ligands, receptors, and role in inflammation. Clin Immunol. 2005; 117(2): 104- 111
17- Young B, Gleeson M, Cripps AW. C-reactive protein: a critical review. Pathology. 1991; 23(2): 118- 124.

18-Ridker PM. Clinical application of C-reactive protein for cardiovascular disease detection and prevention. Circulation;2003.107(3):363-9.
19-- Reitman, S. and Frankel, S. A. colorimetric method for the determination of serum glutamic oxalacetic and glutamic pyruvic transminases. Amer. J. Clin. Path;1957. 28(1): Pp. 56-63.
20- Kind,P. R. and King, E. J. Estimation of plasma phosphatase by determination of hydrolysed phenol with amino-antipyrine. J. Clin. Path.;1954.7:322-326.
21- El- Shabrawy .M.Al sadik .M.E. El shafei.M. Abdelmoaty .A.A. et al. Interlekin 6 and C-reactive protin /albumn ratio as predictors of COVID-19 Severity and mortality . The Egyption Journal of Bronchology .2021.15:5.

22- Ahnach,M. Zbiris.S. Najjari.S. Ousti.f. and Elkettani ,C- reactive protein as an early predictor of COVID-19 Severity .J.Med.Biochem. 2020.39 (4):500-507.

23- Osmand ,A.P, Friedenson.B, Gewurz .H.et al. Characterization of C- Reactive protein and the complement subcomponent Clt as homologous proteins displaying cyclic pentameric symmetry .Immunology .1997:74:739-743.

24- Woo.p, Korenberg J.R.Whitehead .A.S, Characterization of Genomic and Complementary DNA Sequence of Human C-reactive protein and Comparison with the Cornpiementary DNA Sequence of Serum Amyloid p Component. The Journal of Biological Chemistry;1985:13384-13388.

25- Ahnach,M. Zbiris.S. Najjari.S. Ousti.f. and Elkettani ,C- reactive protein as an early predictor of COVID-19 Severity .J.Med.Biochem. 2020.39 (4):500-507.

26- Ali.N.Elevated level Of C-reactive protein May bean early Mavkev to pvedict Visk For Severity of COVID-19. Journal of Medical Virology / Volume92 Or, issuell P.2uoq-2411.2020.

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 03, 2023

27-Wang Y, Liu S, Liu H, et al. SARS-CoV-2 infection of the liver directly contributes to hepatic impairment in patients with COVID-19. Journal of hepatology.2020; 73(4): 807-816.

28-Qin C, Wei Y, Lyu X, et al. High aspartate aminotransferase to alanine aminotransferase ratio on admission as risk factor for poor prognosis in COVID-19 patients. Scientific reports.2020; 10(1): 1-10.

29-Ghaith MM, Albanghali MA, Aldairi AF, et al. Potential Predictors of Poor Prognosis among Severe COVID-19 Patients: A Single-Center Study. Canadian Journal of Infectious Diseases and Medical Microbiology (2021)

30-Das B, Bhatia SY, Pal PM. Evaluation of the Role of Routine Laboratory Biomarkers in COVID-19 Patients: Perspective from a Tertiary Care Hospital in India. Indian Journal of Clinical Biochemistry2021; 1-12.

31-Hachim MY, Hachim IY, Naeem KB, Hannawi H, Al Salmi I, Hannawi S. D-dimer, troponin, and urea level at presentation with COVID-19 can predict ICU admission: a single centered study. Frontiers in Medicine, 7. (2020).

32-Jayasri K, Pooja CH, Padmaja K, Prasad PE. Review on biochemical alterations in COVID-19 patients. International Journal of Clinical Biochemistry and Research.2020; 7(3): 307-311.

33-Huang C, Wang Y, Li X, Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet 2020;395 (10223):497–506.

34-Cai Q, Huang D, Yu H, Zhu Z, Xia Z, Su Y, Li Z, Zhou G, Gou J, Qu J, Sun Y. COVID-19: abnormal liver function tests. Journal of hepatology. 2020 Sep 1;73(3):566-74.

35- Hwaiz R , Mohammed Merza M, HamadB, Shirin HamaSalih , Mustafa Mohammed , Harmand Hama . Evaluation of hepatic enzymes activities in COVID-19 patients Int Immunopharmacol. 2021 Aug;97:107701.

36-Sun J, Aghemo A, Forner A, Valenti L. COVID‐19 and liver disease. Liver Int 2020;40:1278‐81.

37-Xu Z, Shi L, Wang Y, et al. Pathological findings of COVID‐19 associated with acute respiratory distress syndrome. Lancet Respir Med 2020;8:420‐2.

38-Pedersen SF, Ho YC. SARS‐CoV‐2: A storm is raging. J Clin Invest 2020;130:2202‐5.

39-Guan GW, Gao L, Wang JW, et al. Exploring the mechanism of liver enzyme abnormalities in patients with novel coronavirus‐infected pneumonia. Zhonghua Gan Zang Bing Za Zhi 2020;28:100‐6.

ISSN:0975 -3583,0976-2833 VOL14, ISSUE 03, 2023

40- Alkanaani MI, Rajab ER, Abdulwahed AM, Dabos T, Alshammiri B, Abdullah SN, Al-Samarraie MQ. Visfatin hormone level and lipid profile in some hyperlipidemia patients in samarra city. Biochem. Cell. Arch. 2020;20(1):1191-3.