International Journal of Pharmaceutical and Bio-Medical Science

ISSN(print): 2767-827X, ISSN(online): 2767-830X

Volume 03 Issue 07 July 2023

Page No: 345-349

DOI: https://doi.org/10.47191/ijpbms/v3-i7-06, Impact Factor: 6.858

Biochemical Changes in Patients Infected with Corona virus SARS-2 of Babylon Province, Iraq

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ABSTRACT

This study was conducted in the province of Babylon to evaluate various biochemical alterations in patients who had contracted the coronavirus SARS-2. Between October 2021 and March 2022, thirty patients with the coronavirus SARS-2 who were admitted to hospitals in the province of Babylon ranged in age from 20 to 40. Additionally, fifteen healthy patients between the ages of 20 and 40 served as the control group. In this investigation, biochemical kits provided by the companies Chemistry analyzer smar_150 and Fuji film chemistry analyzer were used to evaluate GOT, GPT, ALP, LDH, CPK, Na, and Cl in the serum of patients and control groups. Two categories of these parameters are measured. The findings of the current study indicate that while there were no significant differences in GPT, there were substantial increases in GOT, ALP,LDH, and CPK in patients compared to the control group, as well as a significant difference in calcium, sodium, and potassium concentration between patients and controls.

KEYWORDS: Corona virus SARS-2, Patients, Biochemical changes, Iraq

ARTICLE DETAILS

Published On:
19 July 2023

Available on:
https://ijpbms.com/

INTRODUCTION

One of the most lethal respiratory viruses is Covid-SARS-2. The virus spreads quickly through coughing, sneezing, talking, and contaminating hard surfaces with droplets of contaminated air. People with comorbidities are more vulnerable to the disease's symptoms, which can range from mild to catastrophic cases. As a result, they are more likely to have severe disease development.(1),The first SARS-CoV-2 case to be reported in Iraq was discovered in the city of Al-Najaf on February 22, 2020 (1). COVID-19 is the name given to the coronavirus disease.A single-stranded RNA virus called the SARS-CoV-2 is protected by a capsid protein (2). The COVID-19 virus, like its ancestor SARS-CoV, has the potential to cause a fatal illness. Due to its extensive geographic impact on an exceptionally high percentage of the global population, the WHO has designated it as a global pandemic of public health (3). COVID-19 is a severe illness that can affect many organs via the lungs. The kidney, liver, muscles, nervous system, and spleen are some of these organs (4). Since SARS-CoV-2 enters cells through binding to angiotensin-converting enzyme-2 (ACE2), one of the key blood pressure regulation routes, the renin-angiotensin-aldosterone system (RAAS) may be involved in the pathophysiology of COVID-19. The equilibrium of the Angiotensin Converting Enzyme (ACE) and ACE2 controls the physiological homeostasis of this system. Angiotensin I (Ang I) is transformed by ACE into angiotensin II (Ang II), which, upon interacting with the AT1R, causes a severe vasoconstriction as well as the activation of proinflammatory, proapoptotic, and profibrotic pathways in the lung and other organs (5).

MATERIAL & METHODS

Materials:

Samples collection:

The study comprised 30 participants with ages ranging from 20 to 40. Between October 2021 and March 2022, those patients were treated at the hospitals of the Babylon province and tested positive for the SARS-CoV coronavirus.

Controls:

In this study, 15 controls with ages ranging from 20 to 40 years were used as controls. They were clinically evaluated by specialists. Chosen at random from the population throughout the same time period.

METHODS

According to results from Babylon hospitals, 2ml from the serum of 30 patients who tested positive for the Corona virus SARS-2 and 2ml from 15 healthy volunteers were employed in the current investigation. This samples were evaluated using kits from two companies, Chemistry analyzer smar_150 (USA) and Fuji film chemistry analyzer (Japan), for the evaluation of ten parameters, including the enzymes GPT,GOT,ALP,LHD, and CPK as well as minerals Cl,Na,K,Ca, and Zinc.

Statistical analysis:

Data of the present study were statistical analysis by Spss program version 26 and possibility level ($P \leq 0.05$)

RESULTS:

Results of the current study indicate to many changes in biochemical parameters enzymes or electrolytes or mineral. This changed recorded in tables below (1-10)

Table (1) GPT concentration in patient group infected with SARS-2 COVID compared with control group.

(Sig)	mean		df	T test
	patient	control		
.0.067	29.2±2.99	18.8±1.46	38	-3.193

There is no significant difference between patient and control in GPT concentration with ±SE .

Table (2) GOT concentration in patient group infected with SARS-2 COVID compared with control group.

(Sig)	mean		df	T test
	patient	control		
.0.00	220.6±21.9	35.66±1.9	43	5.907

There is significant difference between patient and control in GOT concentration with ±SE.

Table (3) ALP concentration in patient group infected with SARS-2 COVID compared with control group.

(Sig)	mean		df	T test
	patient	control		
.0.00	425.2±43.7	244.1±13.5	43	-3.519-

There is significant difference between patient and control in ALP concentration with ±SE.

Table (4) CPK concentration in patient group infected with SARS-2 COVID compared with control group.

(Sig)	mean		df	T test
	patient	control		
0.00	83.7±4.3	245.1±17.7	43	-11.668-

There is significant difference between patient and control in CPK concentration with ±SE.

Table (5) LDH concentration in patient group infected with SARS-2 COVID compared with control group.

(Sig)	mean		df	T test
	patient	control		
0.02	453.23±40.3	322.06±17.7	43	2.235

There is significant difference between patient and control in LDH concentration with ±SE.

Table (6) calcium concentration in patient group infected with SARS-2 COVID compared with control group.

(Sig)	mean		df	T test
	patient	control		
.0.01	2.535	9.706	42	-2.450-

There is significant difference between patient and control in calcium concentration.

Table (7) CL concentration in patient group infected with SARS-2 Covid compared with control group.

(Sig)	mean		df	T test
	patient	control		
0.055	96.66	92.	43	1.974

There is no significant difference between patient and control in CL concentration.

Table (8) K concentration in patient group infected with SARS-2 COVID compared with control group.

(Sig)	mean		df	T test
	patient	control		
0.05	13.34 ±33.9	4.9 ±0.95	43	1.377

There is significant difference between patient and control in K concentration .

Table (9) Na concentration in patient group infected with SARS-2 Covid compared with control group.

(Sig)	mean		df	T test
	patient	control		
0.04	132.7 ±7.7	141.66 ±3.81	42	4.47

There is significant difference between patient and control in Na concentration .

Table (10) Zinc concentration in patient group infected with SARS-2 COVID compared with control group

(Sig)	mean		df	T test
	patient	control		
0.119	70.7 ±17	78.06 ±7.01	43	1.593

There is no significant difference between patient and control in zinc concentration .

DISCUSSION

The purpose of the current study is to assess how the novel SARS-CoV-2 infection affects heart and liver enzymes. This study reported the clinical traits of 30 patients who were admitted to the Babylon Hospitals and had COVID-19 symptoms and COVID-19 positive tests. Serum glutamic oxaloacetic transaminase (GOT) and pyruvic transaminase (GPT), alkaline phosphate (ALP), lactate dehydrogenase (LDH), and creatine phosphokinase (CPK) are the previous names for AST and ALT.The most common screening tests to determine the liver and heart's functioning state are CPK. In the current investigation, there were no discernible differences between the sick group and the control group in terms of GPT or GOT.

Compared to other studies, this one mentions alterations in liver enzyme levels were observed in individuals with abnormal liver enzyme levels and liver damage in patients with Corona SARS infection. Significant elevation of alanine transaminase and These inflammatory marker levels and the measures of liver function showed a strong positive connection. ALP results in patients were significantly elevated in COVID-19-confirmed cases because this enzyme is present throughout the body but is primarily found in the liver, bones, kidneys, and digestive system. Several studies have shown the various degrees of elevated liver test markers in COVID-19 patients, with the majority of cases being reported by alanine aminotransferase (ALT), aspartate aminotransferase (AST), and ALP. ALP may seep into the bloodstream if the liver is injured.

ALP levels above normal can be a sign of liver or bone problems. Additionally, patients' LDH levels did not change Significantly from those of the control group.These findings might suggest that LDH is normal, represents the absence of tissue/cell death, and is linked to a few straightforward illnesses, such as liver and lung disease. Because the LDH is a crucial enzyme for anaerobic respiration and because its production has been shown to be increased in hypoxic conditions in the liver, LDH levels are associated with severe SARS-CoV-2 pneumonia and mortality. Moreover, the normalization of serum LDH was consistently accurate in predicting the patients' response to treatment. LDH levels have been linked to severe SARS infection in the past, [7] according to research.Respiratory collapse and hypoxia have also been connected to the pathogenesis of SARS-CoV-2. As a result, there is strong evidence that links high.

The current study differs from studies in other nations that mentioned that patients had increased LDH values in China, America, Italy, and Australia since the data showed no evidence of a significantly elevated LDH level. In line with our findings, two investigations from Wuhan revealed that roughly 19 SARS-CoV-2 patients had high AST levels. These studies were conducted at single or multiple facilities, and they have previously demonstrated that SARS-CoV-2 patients exhibit symptoms of liver impairment. In a larger American cohort of 5700 patients, respectively, 59% and exhibited AST and ALT readings above ULN.

In contrast to our findings, two separate investigations from Northern Italy and Austria found that AST was upregulated in admitted patients who had SARS-CoV-2, respectively. In contrast, fewer patients in the trials from Rome and Zhejiang Province had abnormal AST levels. Patients with SARS-CoV-2 in Wuhan and Zhejiang Province had higher levels of

LDH, according to research [10]. Early findings from Asia hinted that a worse prognosis for SARS-CoV-2 might be correlated with elevated serum levels of the muscle enzyme creatine phosphokinase (CPK) [11].

We found elevated blood levels of AST and ALT, glutamic oxaloacetic transaminase (GOT) and pyruvic transaminase (GPT), alkaline phosphate (ALP), lactate dehydrogenase (LDH), and creatine phosphokinase (CPK) as we reviewed the data in accordance with smoking patterns. The most frequent screening test used to assess how well the heart and liver functioned in a limited group of people was the CPK. Multiple patients also reported increased ALP values. It's interesting to notice that both sick and control subjects had considerably different ALP levels. It is known that the patient's actions may have altered ALP levels. However, a thorough investigation into the connection between ALP levels and SARS-CoV-2 patients has not been done.

The results showed that mortality is significantly higher and disease severity is lower in patients with lower blood calcium levels. The fact that calcium homeostasis is mostly regulated by hormonal mechanisms, namely PTH, means that the way in which the virus needs calcium for reproduction and survival does not totally account for the low blood calcium levels discovered in SARS-CoV2 infection. This suggests that inflammation and hypocalcemia may be related. According to studies, cytokines can interfere with the expression of the calcium receptor, which results in an imbalanced level of serum calcium. 37 Studies have shown that the blood levels of inflammatory markers like cytokines are higher in SARS-CoV-2 patients than in healthy individuals. 38 , 39 Proinflammatory cytokines like interleukin-1 and interleukin-6 are produced in circumstances of severe disease. The association between hypocalcemia and more severe infections and, as a result, increased mortality can be explained by the interaction between blood calcium levels and the immune system.(13-15) The findings of this study further supported the idea that serum calcium levels are negatively linked with mortality and disease severity in SARS-CoV-2 patients. These investigational results are consistent with Martha's findings (2021). Potassium homeostasis is sustained at the systemic level by a combination of internal K+ balance between intracellular and extracellular fluid compartments, dietary intake (100 mmol/day; 5% excretion via the colon), and excretion (5% via the colon) balances (4).

Hypokalemia, which is often defined as 3.5 mmol/L in plasma, shares several traits with SARS-CoV2 infection, including muscle weakness, palpitations, cardiac dysrhythmias, and poor diabetes control (4, 12). The main factor causing hypokalemia during the SARS-CoV2 infection is elevated aldosterone, which promotes potassium loss in urine (16–17).

CONCLUSION

The current study indicated that more than half of SARS-CoV-2 infected patients admitted to hospitals had impaired liver, kidney, and cardiac functions, which were linked to higher levels of inflammatory markers. Significantly more senior and male patients had impaired liver function, and they were more likely to develop serious illness.

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