Measuring biochemical variable after infection with COVID-19

By

Shimaa Hassn Habeb
Department of Chemistry, College of Science, Tikrit University/Iraq
Email: firastaher3@gmail.com

Firas Taher Mahar
Department of Chemistry, College of Science, Tikrit University/Iraq
Email: ameen.aljuraisy@gmail.com

Abstract

Background: Corona virus is in the genus of alpha coronaviruses. Two types of human coronaviruses are human coronavirus 229E and human coronavirus NL63, including a group of coronaviruses, while it belongs to the genus beta coronavirus, the name of modern viruses, and five types of coronaviruses that infect humans, which is human. Coronavirus OC43, HKU1, SARS-CoV, 2-SARS-CoV and ERS-CoV 1. Coronaviruses were first known in 1960 AD, and were named, and then accepted by the International Committee for the Classification of Coronaviruses, that do not have a shape resembling the coronary agglutinin, the characteristic image of the coronavirus, And Corona Corona, which shows it in the form of the king's crown[1] **.Method**: The study included 50 patients suffering from infection with the emerging corona virus and 30 samples of healthy people as a control group, and both groups ranged in age from 27-77 years and of both sexes, collected from Kirkuk General Hospital.A number of biochemical variables were measured in the blood serum of the groups under study, including blood urea and creatinine, two weeks after infection. Result. The study also revealed that the highest levels of urea, creatinine and aminotransferase were recorded in Covid-19 patients at the beginning of the infection and then decreased relatively two weeks after receiving treatment compared to the control group The study revealed that the risk of infection with the Covid-19 virus increases with age, the most affected are the elderly, as the study found th+at 48% of patients were older than 55 years of age and 15% within the age group 41-55 years. The study also found that males were more affected by the virus than females (52% males and 48% females

Keywords: biochemical; infections; COVID-19.

Introduction

On the eleventh of 2020, the World Health Organization classified the emerging corona virus, Covid-19, as a (pandemic), and on the 25th of March of the same year, the United Nations announced that the new corona threatens all of humanity. Continent, which means that Covid-19 is a pathogen that spreads easily from one person to another in the world, and the widespread spread of a disease among animals is called sweeping, and the endemic epidemic is widespread and stable in terms of knowing the number of individuals who contract it because of it is not considered a pandemic. Historically, several pandemics such as smallpox, tuberculosis and plague have appeared[1]. The danger of the Covid-19 virus lies in the nature of its genetic material, which is a single stranded RNA (Positive sen + ve) RNA (ssRNA), which means that there is no template based on it, as well as the absence of a system for correcting errors that may occur during reproduction processes. (As is the case with DNA, which is composed of two strands) with its unstable (brittle) nature, which makes it highly susceptible to mutations, and the most dangerous of that is that the entry of Covid-19 viruses into the cell will not

provoke or stimulate an immediate immune response, because the human cell will not consider it a part Strange, but one of the types of RNA that make up it, and thus the virus takes advantage of this situation to merge with the genome of the host cell (deceived) and multiply and multiply before the defense system discovers it [2]. The virus primarily infects the respiratory and upper digestive tracts of mammals and birds, although the Corna virus causes flu-like symptoms, but it is more severe Symptoms of COVID-19. Common symptoms include cough, fever, loss of smell and taste[3], with less common symptoms including headache, nasal congestion, runny nose, muscle aches, sore throat, diarrhea and in moderate to severe cases difficulty breathing Three common groups have been identified Symptoms: A group of respiratory symptoms accompanied by cough, phlegm, shortness of breath, and fever. A group of musculoskeletal symptoms with muscle and joint pain, headache. A group of digestive symptoms accompanied by abdominal pain, vomiting and diarrhea[4]

Urea

A water-soluble organic nitrogen compound that is produced during the urea cycle in the liver from ammonia that is produced from the deamination of amino acids and is the end product of protein metabolism [5]

The formation of urea is the main way to get rid of excess nitrogen from the body's need by excreting it in the urine, as each urea molecule contains about half of nitrogen (the molecular weight of urea = 60 and each molecule contains two atoms of nitrogen with an atomic weight = 28) after the formation of urea, it is It goes to the excretory system through the blood circulation, where it is filtered through the glomeruli of the kidneys

Glomeruli) and it travels through the renal tubules (Proximal tubules), where it is partially absorbed, and the rest is excreted out of the body with urine.[5]
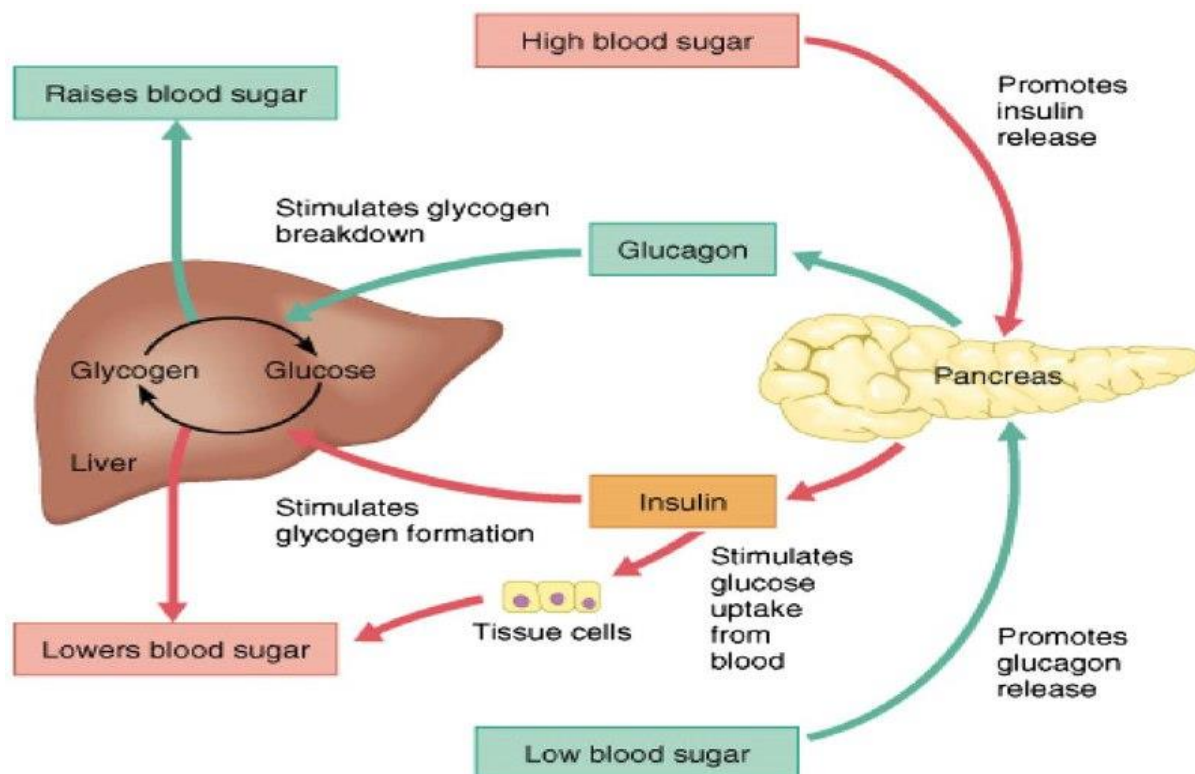
Creatinin

Creatinine is a product derived either from muscle creatine phosphate, or directly from creatine. Creatinine is mainly excreted from the blood by the kidneys, although a small amount is actively excreted by the kidneys in the urine.

Creatinine spontaneous formation occurs during the conversion of creatine to phosphocreatine by creatine kinase. Creatine is removed from the blood primarily by the kidneys.

Men tend to have higher concentrations of creatinine than women because they have more skeletal muscle mass[7].

Corona Effect on Kidney Function
Studies have found that the attack of the Corona virus on the body's immune cells and leads to the secretion of cytokines and the events of the so-called cytokine storm, which is part of the body's immune response to infection, but its secretion in a large amount leads to multiple organic imbalances and then death. Studies have found that the level of urea nitrogen for patients rises after hospitalization and indicates This is due to early kidney injury[8]

Figure1 *The mechanism of the corona virus attack on sites in the kidney tissue*

Materials and methods

Creatinin

Creatinine reacts with picric acid to produce the colored compound, the alkaline creatinine picrate, The change in absorption is proportional to the creatinine concentration. 1- Creatinine base (R1) • Sodium hydroxide – 300mmol/L • Phosphate – 25mmol/L 2- Pigment Creatinine (R2) picric acid 3- Urea B standard 4 x 1 of Urea B at a standard concentration of 40 mg/dL01:07

Sample	Standard	Blank	pull in test tube
1ml	1ml	1ml	Detector
	100μL		standard
100μL			Sample

Mix and read the optical density(T1) after 60 seconds of the sample, or the standard addition after 60 seconds, exactly. From the first reading, take the second reading at a wavelength of 492
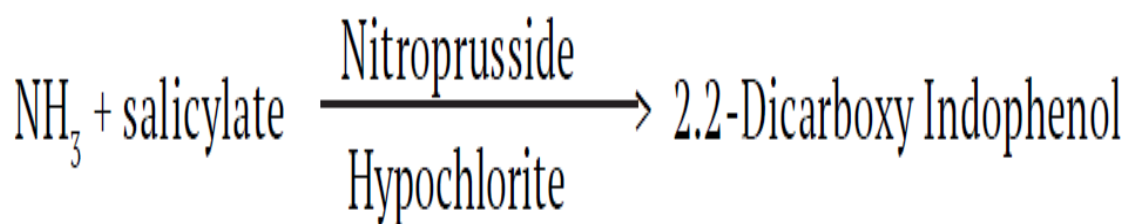
Manual calculation

A2 - A1 =ΔA sample orΔA standard
Concentration of creatinine in serum or plasma.

$$\frac{\Delta Asample}{\Delta Asample} \times standard\ conc\left(\frac{mg}{dl}\right) = mg/dl$$

Urea

$$Urea + H_2O \xrightarrow{\text{Urease}} 2NH_3 + CO_2$$

$$NH_3 + salicylate \xrightarrow[\text{Hypochlorite}]{\text{Nitroprusside}} 2.2\text{-Dicarboxy Indophenol}$$

b- Reagent used solutions

Urea Color B (R1)
Sodium salicylate 80 mmol/L.
Reagent R1 Sodium nitroprusside 4 mmol/L.
Sodium hypochlorite 45 mmol/L.
Urea (R2)
Phosphate solution pH = 6.9) 60 mmol / liter.
Uric enzyme 20 kg / liter
Urea B standard: 4 x 1 ml Urea B standard at a concentration of 40 mg/dL

Procedure

Sample	Blank	Standard	pull in test tube
1ml	1ml	1ml	Detector
	10µL		Standard
10Ml			Sample
		Mix and incubate for 5m	
1ml	1ml	1ml	color detector
		.Mix and incubate for 5m	
600nmMix well and measure the absorbance of the sample and standard against aweve length blank reagent600nm			

Urea Concentration(mg/dl) =(A Sample/A Standard)*C standrd

Results and Discussion

Table No.1: patients before giving treatment and patients after giving treatment

P. value	Study group			Variables (Mean±SD)
	Control group (n:30)	(n:50) Covid patients		
		After treatment	Before treatment	
0.0001	26.3±5.6	64.6±12.3	78.3±13.5	Urea blood (mg/dl

0.0001	0.74±0.25	1.36±0.31	1.66±0.34	Creatinin(mg/dl)

The study also revealed that the highest urea levels were recorded in Covid-19 patients (78.3 ± 13.5) ng/ml, then its rate decreased relatively after two weeks of receiving treatment (64.6 ± 12.3) mg/dL, compared to the control group (26.3 ± 5.6) mg / deciliter. The difference was highly statistically significant (P≤0.0001) between patients before giving treatment and patients after giving treatment and control group, where the difference was very large between patients before giving treatment and patients after giving treatment on one hand and on the other hand between patients after giving treatment and control group.

The study also revealed that the highest creatinine levels were recorded in Covid-19 patients (78.3 ± 13.5) mg / deciliter, and then its rate decreased relatively after two weeks of receiving treatment (964.6 ± 12.3) ng / ml, compared to the control group (26.3 ± 5.6) mg /dl. The difference was highly statistically significant (P≤0.0001) between patients before giving treatment and patients after giving treatment and control group, where the difference was very large between patients before giving treatment and patients after giving treatment on one hand and on the other hand between patients after giving treatment and control group.

early diagnosis, appropriate treatment, and future control measures are all essential to limit the spread the virus, Laboratory parameters play an role in the early assessment of disease etiology, diagnosis, treatment, and follow-up. The SARS-CoV-2 virus might also directly attack the Kidney. All these factors may render infected COVID-19

creatinine and urea whose evaluation in serum helps to assess renal function. In agreement with our finding, Cheng et al., [9] found that urea and creatinine were found to be rate higher in COVID-19 patients compared with survivor cases after cure and the control healthy individuals. A recent study showed that high BUN levels at admission were robustly associated with adverse outcomes in critically ill patients admitted to the ICU [10]. However, Li, et al., [11] found that B. urea and S. creatinine didn't increase at admission due to COVID-19 infection. The difference from our finding may be due to clinical characteristics of patients and comorbidities of COVID-19 patients

Distribution of study groups according to body mass index

The study showed that COVID-19 patients had a high average BMI (30.13 ± 3.16 kg/m2) compared to the control group and that their BMI decreased slightly after two weeks of infection and treatment (29.69 ± 2.18 kg/m2), while its average was normal. In the body control group (25.76±2.62 kg/m2), the difference was significant between groups (P. value < 0.001) as shown in Table no. 2

Table No.2: significant between groups (P. value < 0.001)

P. value	BMI (mg/dl) Mean±SD	number	study groups
0.001	30.13± 3.16	50	Covid patients before treatment
	29.69±2.18		Covid patients before treatment
	25.76±2.62	30	control group

In agreement with our findings, a study conducted in the city of Kirkuk showed that the majority of infected Covid-19 patients were obese and overweight[12]. An observational study of 24 critically ill patients diagnosed with COVID-19 in the Seattle area was one The first studies reporting BMI data confirming that 20 patients were overweight or obese[13]. In addition, a small study at the University Hospital in Lille, France, reported that the need for ventilator in 124 patients with COVID-19 was greater for those with a BMI greater than 35 kg/m2,

regardless of other risk factors[17]. Obesity-related effects on the immune system play a major role in the pathogenesis and outcomes of most viral infections such as COVID-19 disease and obesity is also associated with increased inflammatory response in adipose tissue[18-19]. In contrast, the inflammatory response in adipose tissue can lead to metabolic dysfunction, which can lead to dyslipidemia, insulin resistance, diabetes mellitus, hypertension, and cardiovascular disease. From the lungs, which leads to a decrease in the oxygenation of vital tissues

Distribution of Covid-19 patients according to infection results

The study showed that 74% (37 out of 50) of patients infected with Covid-19 virus improved after two weeks of infection, 22% had complications of infection while unfortunately, 4% (3 of 50) died due to complications of Covid-19 infection, as in Table no.3

Table No.3: patients infected with Covid-19 virus

%	Number	Patients
74	37	Recovering
22	11	Complicated
4	2	Death
100	50	The total

The lethal outcome was documented in only 4%. Overall, the association of severity and lethal outcome with age and comorbidity is consistent with the results of studies conducted in Iraq[13] and another countries[14-15]

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