

## Evaluation of the level of vitamin D3 in the blood serum of patients infected with COVID-19 in Al-Amiriya city

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**Abstract.** The researchers used 60 samples, 35 of which were infected with the developing corona virus and 25 of which were healthy and disease-free. Their ages ranged from 30 to 55, and the samples were taken from their homes. Al-Amiriya Hospital in An bare Governorate. After that, blood was collected from healthy and sick people and separated by centrifugation. The biochemical variables were Determination, including (CRP ,ferritin, Vit.D3) .

In comparison to healthy people, people infected with the developing corona virus had significantly higher levels of C-reactive protein and ferritin in their blood serum, according to the findings of the current study. Also When compared to healthy people, Vit.D3 levels in blood serum of people infected with the developing corona virus were shown to be significantly lower.

**Key words:** COVID-19, Vit.D3, Ferritin.

### Introduction

In 2019, another type of coronavirus appeared, which is the Corona virus (COVID-19), which was first reported in the Chinese city of Wuhan, and then cases of infection spread throughout the world, as One of the coronaviruses with RNA is the causal agent. SARS-CoV-2 is a single-enveloped, linear virus., which has the potential to target lung cells <sup>(1)</sup>. The virus began in Wuhan in The virus was first identified in late 2019 in China and was dubbed the 2019 Corona virus (2) by the World Health Organization. renamed it to COVID-19 in 2020 <sup>(3)</sup>. Although it is believed that the virus is likely to be of animal origin related to the city's Wahan seafood market, it is still widely spread among humans around the world causing symptoms including fever, cough, shortness of breath, headache, muscle soreness and fatigue <sup>(4)</sup> .

The heterogeneity of the pathways and symptoms of the COVID-19 virus indicates that it is a multifaceted disease, as some patients did not show hypoxemia or respiratory stress during COVID-19 infection. Recently, several studies have reported that C-reactive protein (CRP) is positively associated with severe dengue infection <sup>(5)</sup>. In vitro results for patients with severe symptoms of COVID-19 showed data consistent with the

development of a cellular storm with elevated warning signs. Among them are elevated levels of ferritin in the blood <sup>(6)</sup>.

Moreover, in a study conducted in Italy that included 129 patients, it showed that 13.2% of patients had vitamin D3 levels between (20-30 ng/ml) and 22.5% with vitamin D3 values in the range (10-20 ng/ml) and 54.3 % with a value less than 10 ng/ml). Rodriguez et al. <sup>(7)</sup> also reported in another study in the province of Mexico, which included 172 patients with COVID-19, that cases whose vitamin D3 level is less than (ng/ml8) need special care and hospitalization.

Since the deficiency of some Vitamins in the human body may be a threat to the immune system and thus exposure to many viruses, the current research aimed to evaluate some Vitamins (D3) in the blood serum of patients infected with COVID-19.

### **(Material and Methods)**

#### **Collection of specimens**

The study was conducted on 60 samples, 35 samples were infected with the emerging corona virus and 25 samples were a control group (healthy) without any disease Their ages ranged from 30 to 55 years old, and the samples were taken from them. Al-Amiriya General Hospital in Anbar Governorate. The level of Vit.D3 , Ferritin ,CRP were estimation .Blood collection.

#### **Blood collection**

About 6 cm<sup>3</sup> of blood from healthy and sick people were collected and divided according to the type of test. The blood was placed in Jell tubes with a tight cover and free of anticoagulant, and the blood was left at a temperature of 25°C until clotting, and then placed in a centrifuge for 10 minutes at a speed of 3000 cycles. Then the serum was obtained and then placed in small test tubes and kept in the refrigerator at a temperature of 20 - C for the purpose of measuring the level of some minerals, including Vit.D3 , ferritin and C-reactive protein.

#### **Detremation of Serum CRP levels**

- Serum C-reactive protein by using CRP-latex test kit provided from Specterum - Spanish<sup>(8)</sup>.

#### **Determination of Serum ferritin level**

The MINIVIDAS device was used to measure the concentration of ferritin, and it is one of the advanced and modern devices that is characterized by accurate results and speed of performance, and it works within the technology of Enzyme Linked Immunofluorescence (ELFA) and according to the manufacturer bioMerieux.

**Estimation of Serum Vit.D3 level**

The level of Vit.D was estimated according to the kits prepared by the German Human Company <sup>(9)</sup>.

**Statistical analysis**

The SPSS statistical program was used and the rate and standard deviation of the rate were determined, as well as the averages for the group of people infected with Coronavirus and the control group were determined using the T.Test and at a probability level  $P \geq 0.05$ .

**Result and Dissection**

**Table (1):** shows the mean  $\pm$  standard deviation of the CRP , Ferritin and Vit.D3 of the samples under study

Mean $\pm$ S.D			The studied variables
P $\leq$	patients n=35	Control n=25	
**	87.101 $\pm$ 16.135	5.282 $\pm$ 1.344	C-reactive protein mg/L
**	445.2 $\pm$ 75.0	126.4 $\pm$ 25.3	ferritin ng/ml
**	10.987 $\pm$ 2.345	32.453 $\pm$ 4.321	Vit.D3 ng/ml

**Estimation of CRP level in blood serum**

**Table (1)** shows the mean  $\pm$  S.D of the level C-reactive protein (CRP) in blood serum, as the results revealed a considerable increase in CRP levels in the blood of patients infected with the developing corona virus when compared to healthy people., as shown in Fig (1)

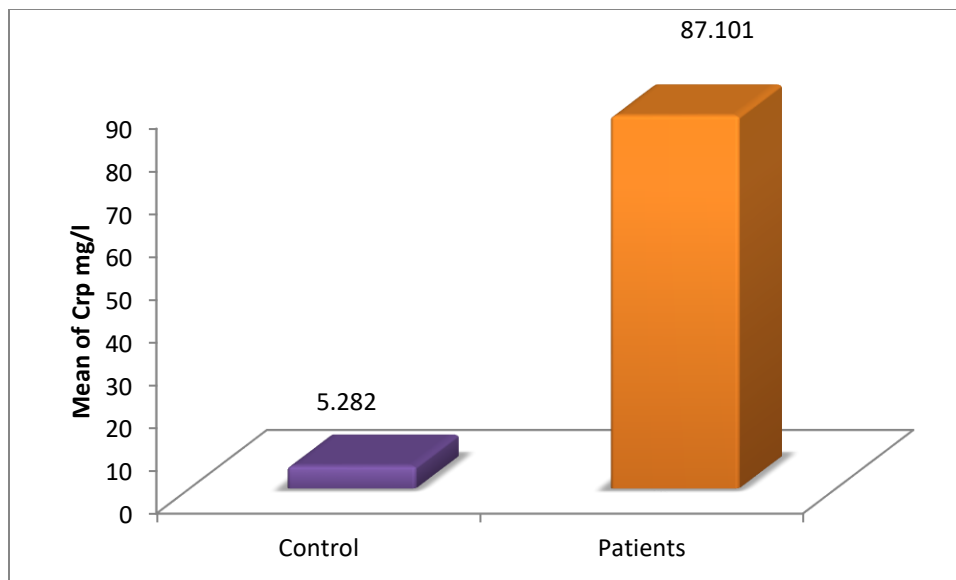


Fig (1): - The average level of the C-reactive protein in the blood serum of the samples under study

The Higher CRP concentrations occur as a result of eliminating viral infections, and the immune system responds more strongly by producing different immune molecules, and CRP production outside the threshold may lead to dysfunction of different organs in patients infected with COVID-19 virus. <sup>(10)</sup>.

Herold <sup>(274)</sup> mentioned in a study of 89 people infected with the emerging coronavirus COVID-19 that CRP is elevated in patients with COVID-19 and suggested that the level of CRP can be adopted as an indication of the patient's response to treatment and to determine the severity of the disease. CRP and kidney and lung damage <sup>(11)</sup>. During viral infection, it is known that the immune system responds strongly to the removal of viruses from the body by releasing several immune molecules and producing CRP. However, when it exceeds the acceptable level, it leads to the failure of the organs of the infected person with COVID-19 to do their duty <sup>(12)</sup>. Since the production of CRP in individuals is under genetic control <sup>(13)</sup>. This explains to us why there are differences in the severity of the disease between one person and another, or one family and another.

**Estimation of ferritin level in blood serum**

**Table (1)** shows the mean ± S.D of the level of ferritin The results revealed a considerable rise in the level of ferritin in the blood of patients infected with the developing corona virus when compared to healthy people., as shown in Fig (2)

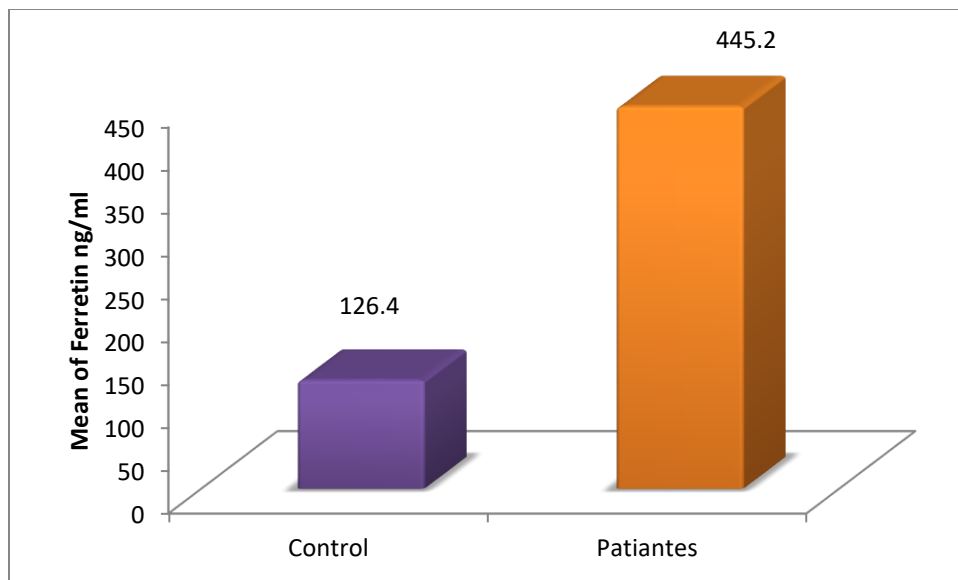


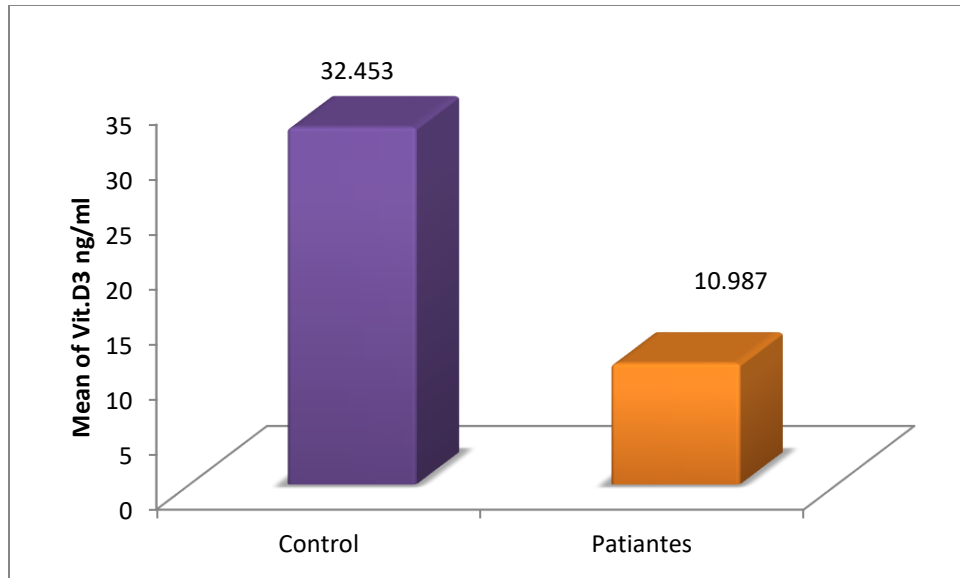
Fig (2): - The average ferritin level in the blood serum of the samples under investigation.

After the spread of the COVID-19 pandemic, there was an urgent need to search for indicators of disease severity and predict it at an early stage, to reduce medical stress and mortality. As an acute-phase protein that can occur in systemic inflammation, ferritin has been identified as discriminatory or predictive. ferritin has been increasingly gaining attention as a risk factor in the diagnosis of COVID-19 <sup>(14)</sup>. However, its value is still being studied even though clinical observation has detected abnormal levels of ferritin in acute phase COVID-19 patients <sup>(15)</sup>.

Kappert *et al*, mentioned, through a review of what was published for nine research studies for the period between February and May 2020, through which it was concluded that the level of ferritin in the blood can be adopted as an indicator of the severity of the disease COVID-19 in hospitalized COVID-19 patients <sup>(16)</sup>. The cause of the increase in ferritin in COVID-19 patients is unknown.is not clear, but it is believed that the increase in ferritin may be attributable to a cytokine storm or activation of macrophages <sup>(17)</sup>.

**Estimation of Vit.D3 level in blood serum**

Table (1) shows the mean ± S.D of the level of Vit.D3 The level of Vit.D3 in the blood of those infected with the developing corona virus was much lower than in the blood of healthy people, according to the findings, as shown in Fig (3).



**Fig (3)** - The average Vit.D3 level in the blood serum of the samples under investigation.

COVID-19 infection and serum vitamin 3D levels have been linked in numerous studies <sup>(18,19)</sup>. The current study's findings were consistent with those of Hastie et al. in the United Kingdom. When doing the analysis and dividing the groups into moderate vitamin 3D and vitamin 3D insufficiency, vitamin deficiency was related with vitamin D3 deficit in a study of 449 patients with COVID-19, they discovered a strong association between infection and vitamin D3 level. 3D and infected with COVID-19 in the other direction. <sup>(20)</sup>.

Jain et al <sup>(21)</sup>. In an observational study of 154 instances of COVID-19, researchers in India discovered that the mean value of vitamin 3D in serum was (27.89 ng/ml) in largely asymptomatic individuals and (14.35 ng/ml) in those infected with COVID-19 who had no symptoms. They developed severe symptoms <sup>(21)</sup> In a study by Mariani <sup>(22)</sup> on the effect of vitamin D3 deficiency on the severe natural course of COVID-19, the results of various research groups around the world suggested that vitamin D3 is a logical therapeutic approach to treating the disease. The study found 46 countries where they suggested an association between low prevalence of vitamin D3 and the risk of infection with COVID-19 virus, disease severity and mortality.

Annweiler et al <sup>(23)</sup> suggested in a critical review that vitamin D3 deficiency could be considered a consequence of COVID-19 infection. Another study indicated that vitamin D3 supplementation may play a protective role before infection with COVID-19 infection, health status monitoring and response to treatment <sup>(24)</sup>. Because the recommended supplement amount for newborns is 1,000 IU, 2,000 IU for children aged 1-10 years, and 4,000 IU for children aged 11-17 years and adults, it is advisable to provide vitamin D3 supplements in regular daily doses rather than as a single dose. <sup>(25)</sup>.

## Conclusions

The current study's findings show that

- 1- individuals infected with the developing corona virus had significantly higher levels of C-reactive protein and ferritin in their blood serum.
- 2- A considerable reduction in Vitamin D3 levels in the blood serum of persons infected with the developing corona virus.

## Recommendations

According to current studies, it's a good idea to:

- 1- Conducting a biochemical analysis to determine the levels of certain vitamins, such as vitamin C, as well as minerals, such as calcium and magnesium, in the blood serum of COVID-19 patients.
- 2- A diet rich in nutritional supplements to strengthen the immune system against numerous viruses

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