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Serum Vitamin D Concentrations in CoVID19 Patients

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ABSTRACT

Background and purpose: Vitamin D deficiency is highly prevalent in Iran. Death toll due to the Coronavirus Disease 2019 (COVID-19) is high in this country. The purpose of the present investigation was to provide more information on the relationship between serum levels of vitamin D in confirmed cases of COVID-19 in Iraq.

Materials and methods: This cross-sectional descriptive study was performed in COVID-19 patients (n=80) attending Al-Mahmoudia Hospital, Iraq 2020, who were confirmed for COVID-19 infection with CT-Scan or RT-PCR. Seventy healthy individuals were also examined as the control group. SPSS V19 was applied for data analysis.

Results: In this study, 80 patients with COVID-19 (mean age: 57.22 ± 17.44 years old) and 70 healthy individuals (mean age: 48.69 ± 12.99 years) were studied. There were 38 and 35 males in these two groups, respectively. Serum Vitamin D levels were significantly lower in patients with COVID-19 than those in the control group (18.72 ± 12.53 vs. 30.86 ± 15.19 ng/ml, P< 0.001).

Conclusion: This study showed that serum levels of Vitamin D were lower in patients with COVID-19 than healthy individuals and frequency of Vitamin D deficiency was higher in these patients. Hence, further studies are needed to clarify the role of serum Vitamin D concentrations in patients with COVID-19 infection.

Introduction

The new corona disease is caused by the severe respiratory syndrome virus (2-CoV-SARS). The first case of this disease was observed in December 2019 in Wuhan, China (1) and was finally declared a pandemic by the World Health Organization (2). (Since no suitable and effective treatment has been introduced for patients infected with COVID-19, identifying individuals who have a high risk of contracting this disease is of great importance, because by identifying individuals at high risk of contracting the disease, it becomes a disease and Individuals at high risk of suffering from the severe form of this disease, adequate prevention measures can be applied for these individuals. On the other hand, considering the high number of patients suffering from COVID-19 and the collapse of the health and treatment system in many countries, the need to recognize the need for pulmonary embolism is high. to ICU services, it can be helpful for better triage of patients and better allocation of resources (3).

Studies have shown the relationship between vitamin D deficiency and the occurrence of upper respiratory tract infection and death caused by the new coronavirus (4,5). (Prior to this, several studies have shown the relationship between low levels of vitamin D and high rates of other types of infections. Respiratory infections have been investigated (6). Vitamin D affects innate and adaptive immunity in several ways, so that vitamin D receptors are continuously expressed on the surface of epithelial cells and immune system cells such as monocytes and macrophages.

Therefore, there is a possibility that vitamin D has a protective role against COVID-19 (7.) In addition to the aforementioned, one of the roles of vitamin D is to suppress the excessive release of inflammatory cytokines, which may lead to a cytokine storm. This complication is one of the important causes of death and complications caused by COVID-19 (8.

The findings of various studies showed a significant difference in the serum level of vitamin D in patients infected with covid in comparison with healthy people (9, 10). In a meta-analysis study it was also shown that a large fraction of covid patients have vitamin D deficiency or insufficiency. 11. Considering the high prevalence of vitamin D deficiency in Iraq (12) and also the high rate of death related to covid in the Iraq, in order to know the influencing factors on the incidence and severity of the disease, in the present study, the blood concentration of vitamin D in patients infected with COVID19 and its relationship with mortality related to covid and the rate of hospitalization in the ICU department and also compared it with the control group.

Materials and methods

This research is a descriptive-cross-sectional study that was conducted by examining the patients visiting Al-Mahmoudia Hospital in Baghdad city in 2020.

The statistical sample of this study includes 80 patients infected with corona virus and their disease was confirmed by a specialist doctor using CT scan or PCR-RT. In order to enter the study, informed consent was obtained from the patients. The patients were studied in two groups, one group of patients who were hospitalized due to Corona and discharged with good general condition and another group of patients who were hospitalized and then transferred to ICU. A control group of examined patients in a study that was conducted before the corona epidemic was considered as a comparison group, by choosing this control group, there is no possibility of infection with the 2-Cov-SARS virus in the people of the comparison group (13). The type and level of vitamin D of the mentioned patients were available and were used for comparison. In this study, vitamin D was reported on a scale of nanograms per milliliter. The levels of vitamin D in the three categories of deficiency (less than normal and) 10-20 ng /ml between (lack of adequacy), 10 ng/ml (more than 20 ml/ng) was investigated. The sample volume was predicted with P = 0.7 and d = 0.1 and confidence level of 95 percent and using the formula Cochrane was determined for 80 people in the group of patients with covid 19. The criterion of withdrawal was the consumption of vitamin D in the past one month. The age, sex, and final outcome of the patients were recorded, and then the obtained information was analyzed by SPSS version 19 statistical software and statistical analysis tests such as Anova, T-test, and chi-square. P less than 0.05 was considered as significance level.

Results:

During this study, 80 patients infected with Covid-19 (with an average age of 57.22 ± 17.44 years) and 70 people as a comparison group (with an average age of 48.69 ± 12.99 years) were examined (0.002). (P = 0.879) (in the two groups of positive covid 19, 38 and 35 were male, respectively (P = 0.879). The serum level of vitamin D in the group of patients infected with the 2019 corona virus was significantly lower than that of the observation group. (respectively, 72.18 ± 53.12 versus 86.30 ± 19.15 units, (P=0.000). During the examination of vitamin D status in the two studied groups, it was found that vitamin D deficiency was significant in the observation group. Compared to the group with covid 19, it was less (P=0.000).

During this study, the final results of 65 patients were available, of which 55 (85%) recovered and 10 (15%) died. The average level of vitamin D in these two groups of patients had no significant difference (P=0.803). It was not statistically significant (P=0.355) (Table 2).

Table 1: Serum 25 hydroxy vitamin status in the studied groups

Variable	Positive Covid	Negative Covid	Meaningful Level
Age (standard deviation ± mean)	57.22±17.44	48.69 ± 12.99	0.002
Gender (male/female)	42.38	35.35	0.870
Serum vitamin D (mean ± standard deviation)	18.72 ± 12.53	30.86±15.19	0.000
Vitamin D deficiency, number (percentage)	(60) 48	(28/5) 20	
Vitamin D deficiency, number (percentage)	(25) 20	(17) 12	0.000
Normal vitamin D, amount (percentage)	(15) 12	(54/5) 38	

Information about hospitalization in the intensive care unit (ICU) was available for 64 people, of which 18 people (28 percent) were hospitalized in the ICU and 46 people (72 percent) did not need to be hospitalized in the ICU The difference in vitamin D serum level between the patients of these two groups was not significant (P=0.844). According to the analysis, it was found that the vitamin D status in patients infected with Covid-19 who had to be hospitalized in the ICU and patients who did not need to be hospitalized in the ICU was different. It was not significant (P=0.449) (Table 2).

Table 2: Serum 25 hydroxyvitamin status in the study groups based on the final outcome

Variable	Deceased	Improved	Meaningful Level
Serum vitamin D (mean ± standard deviation)	18.30 ±10.14	19.45±13.87	0.803
Vitamin D deficiency, number (percentage)	(50) 5	(60) 33	0.355
Vitamin D deficiency, number (percentage)	(40) 4	(20) 11	
Normal vitamin D, amount (percentage)	(10) 1	(20) 11	
	ICU	Non-ICU	meaningful level
Serum vitamin D (mean ± standard deviation)	20.00±10.27	19.26±14.43	0.844
Vitamin D deficiency, number (percentage)	(55) 10	(59) 27	0.449
Vitamin D deficiency, number (percentage)	(17) 3	(26)12	
Normal vitamin D, amount (percentage)	(28) 5	(15)7	

Discussion

In the present study, the serum level of 25 hydroxy vitamin D was examined in patients with covid-19 and a control group selected from among healthy people. The results of this study showed a significant decrease in the mean serum level of vitamin D in the positive covid 19 patients. After months of research and investigation on various aspects of covid-19, several factors such as male sex, older age, cardiovascular diseases, hypertension, Merman's lung disease, obesity and chronic kidney disease are known to be effective in the final outcomes of covid-19 patients. (14, 15). It should be mentioned that one of the most influential conditions in the covid-19 disease is vitamin D deficiency. Different studies show the relationship between vitamin D deficiency and diseases such as malignancies, diabetes, hypertension, and cardiovascular diseases (16-18).

In the study of Im et al., which examined the status of vitamins and salts in patients infected with the 2019 corona virus, similar to the results obtained in the present study, it was determined that

the serum level of vitamin D in patients with covid 19 compared to the control group was It is significantly lower. On the other hand, in this study, the prevalence of vitamin D deficiency was significantly higher in the group of patients with covid-19 (10). The meta-analysis study by Ghasemian and colleagues also showed that a significant fraction of patients with covid-19 suffer from vitamin D deficiency and insufficiency. which is not related to the increased risk of contracting covid-19. (11) (1.75-1.01 confidence interval, 1.33 odds ratio) (contrary to our study, in Faul et al.'s study, it was shown that the serum level Vitamin D was lower in patients infected with the corona virus who ultimately required hospitalization in the ICU, compared to patients who were hospitalized in the general ward with milder symptoms (22). The disease has been reported in several studies (19-21).

Based on the study of Baktash and his colleagues who investigated the status of serum vitamin D and the final outcome of the disease in elderly patients with covid-19, the patients who had a lower level of 25 hydroxyvitamin D than the patients of the same age who received vitamin D supplements and their serum vitamin D levels was normal, they had a worse final outcome (21). In our study, the serum levels of vitamin D in deceased patients and recovered patients were examined and compared in two groups of hospitalized and non-hospitalized patients in the ICU. Nashed (22). The difference observed in the results of the present study and the published studies can be caused by various factors, including the age of the patients under investigation, the presence or absence of underlying disease in the study volunteers, and also the receipt of supplements containing vitamin D. For example, the study of Baktash and colleagues only He studied elderly patients (21).

Conclusion

The results of this study showed that the prevalence of vitamin D deficiency was higher in patients with covid-19 and the average serum level was significantly lower in these patients. During the investigation, it was found that there is no difference between the average serum level of vitamin D and the status of vitamin D in critically ill patients and patients with a better general condition.

Among the limitations of the present study, it can be mentioned that the study was conducted in a single-centered and single-centered manner. Therefore, according to the limitations of this research, it is recommended to conduct studies with a larger sample size and investigate the intervening factors to more accurately evaluate the role of vitamin D in the disease of Covid-19 and its relationship with the severity of the disease. One of the strong points of the present study was the comparison with the samples before the corona outbreak, which could definitely be sure that they were not infected.

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