

## Deficiency of Vitamin D Lead to Death in Patients with Covid 19

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### ABSTRACT

**Aim:** We conducted this study to determine the increase rate of mortality and effect of anesthesia in covid-19 patients with severe vitamin D deficiency.

**Study Design:** Observational study

**Place and Duration:** King Salman Armed Forces Hospital Tabuk, Saudia Arabia/ Rashid Latif Medical College, Lahore. Jan 2021-Jun 2021

**Materials & Methods:** One hundred and seven patients, both males and females, with pandemic disease (coronavirus) were included in the study. Patients ranged in age from 16 to 80 years. Following the receipt of written consent, demographic information such as age, gender, and BMI were collected and analysed. A 5 mL blood sample was taken from each patient in order to determine their vitamin D levels. Patients in the intensive care unit (ICU) who were seriously ill or experiencing severe pain were given general anaesthesia. If 25(OH)D was less than 25 nmol/L (10 ng/dL), severe vitamin D deficiency was considered. The relationship between vitamin D deficiency and the rate of mortality among patients was investigated. The SPSS 25.0 version was used to analyze all of the data in this study.

**Results:** 33.07±12.87 years were the mean age of the patients with mean BMI 23.01±6.32 kg/m<sup>2</sup>. Among 107 cases, most of the patients were males 67 (62.6%). Vitamin D deficiency was found among 55 (51.4%) patients in which most of the patients were serious ill those received anesthesia. We found that 33 (30.8%) patients were died in which most of the patients. Patients with covid-19 disease who had low vitamin D levels had a higher mortality rate than those who had normal vitamin D levels, according to a study that was statistically significant at the 0.04 level of significance.

**Conclusion:** We concluded in this study that the patients with severe coronavirus disease with vitamin D deficiency had higher rate of mortality.

**Keywords:** Severe Vitamin D Deficiency, Mortality, Anesthesia, Pandemic Disease

### INTRODUCTION

More than 300 metabolic pathways in humans depend on vitamin D, which is a fat-soluble steroid hormone formed primarily through photosynthesis and has a nuclear-binding receptor and signal transduction mechanisms expressed in nearly all cells and tissues. Recently, new research has shown that vitamin D has important effects on health and disease that go beyond the musculoskeletal system. [1–4] Study after study has shown a significant reduction in intensive care mortality as a result of supplementation with vitamin D [5–6].

The coronavirus has spread around the world, resulting in a wide range of health problems. As of February 11, 2020, COVID-19 was the first time the term had ever been used by the World Health Organization (WHO) in its history. Chinese city Wuhan was the site of the outbreak. [7,8] SARS-CoV-2, a virus that poses a serious threat to the entire human population, has been linked to this illness. Patients with COVID-19 infection show a wide range of clinical characteristics despite the virus causing mild illness in 17.9% of cases and serious illness in only 15.7% of patients who were admitted to the hospital. Radiologic abnormalities were not found in the vast majority of critically ill patients when they were first admitted to the hospital. [10]

When the immune system is compromised, COVID-19 infections, which can be deadly or result in significant sickness, can be aggravated even worse. The capacity of the immune system to perform its functions adequately is

critical to the body's ability to operate normally. In a number of recent research, it has been demonstrated that vitamin D is a crucial support factor for immune system function, notably in the control of inflammation in response to viral infection. As a crucial component of the body's immune system, both in terms of its innate and adaptive activities, this fat-soluble vitamin plays a critical role. Vitamin D is essential for bone health as well as for maintaining good skin, and both of these things are quite important. It is impossible to overestimate the importance of vitamin D in maintaining bone health and avoiding fractures. Prior study has also demonstrated that adequate vitamin D consumption can lower the prevalence of viral respiratory infections as well as the amount of time spent in the hospital. However, despite the fact that vitamin D supplementation may decrease the risk of infection with COVID-19, the specific mechanism by which vitamin D supplementation lowers the risk of infection with COVID-19 is currently under investigation. [11]

For certain persons, taking vitamin D supplements may be necessary to ensure enough protection against COVID-19. The findings of a recent study revealed that vitamin D has anti-inflammatory and immunomodulatory capabilities, which is fantastic news for the general public. Antibiotics and viruses cause the body to manufacture and acquire immune systems when it is attacked by bacteria or viruses, and vitamin D can have an impact on the development of these systems. It will be unable to benefit from vitamin D unless a functional vitamin D receptor has been developed (VDR). [12] One of its activities is to inhibit

the enzyme ACE-2, which is responsible for the regulation of the renin-angiotensin system. By supplementing with vitamin D during therapy, it is possible to avoid acute respiratory distress syndrome (ARDS) and cytokine storm, which are two of the most prevalent causes of mortality in COVID-19.

The current study's objective was to examine whether there is a relationship between severe vitamin D deficiency and death in persons who have been diagnosed with severe Covid-19 disease.

## MATERIALS AND METHODS

An observational study was carried out at King Salman Armed Forces Hospital Tabuk, Saudi Arabia/ Rashid Latif Medical College, Lahore. Patients diagnosed with severe covid-19 were eligible to enrol in this study, and both males and females were participated included. Once we had obtained each participant's written consent, we began collecting demographic information about them, such as their age, gender, height, and weight. Patients taking vitamin D supplements were excluded from the study, as were those who did not provide informed consent.

Real-time PCR testing was performed on all of the patients in order to determine whether or not they had covid-19 illness. A 5 mL blood sample was taken from each patient to determine their vitamin D levels. Severe Vitamin D insufficiency was defined as 25 nmol/L (10 ng/dL) 25-hydroxyvitamin D concentration. Anesthesiologists used intravenous procedure to give anesthesia among serious ill patients. An association between low vitamin D levels and an increased risk of death has been discovered. All of the information was analysed and interpreted using SPSS 25.0. Tables were used to keep track of percentages and frequency distributions. The relationship between vitamin D deficiency and death was investigated using chi-square tests. Results that were statistically significant were those with a p-value less than 0.04.

## RESULTS

33.07±12.87 years were the mean age of the patients with mean BMI 23.01±6.32 kg/m<sup>2</sup>. Among 107 cases, most of the patients were males 67 (62.6%). 42 (39.3%) cases had urban residency and majority of the patients had poor socio-economic status 77 (71.9%). 27 (25.2%) patients were admitted in ICU and received anesthesia. (table 1)

Table no 1: Baseline patients information and details

Variables	Frequency	%age
Sex		
Male	67	62.6
Female	40	37.4
Mean Age (years)	33.07±12.87	
Mean BMI (kg/m <sup>2</sup> )	23.01±6.32	
Residency		
Urban	42	39.3
Rural	65	60.7
Socio-economic status		
Poor	77	71.9
Good	30	28.1
Use Anesthesia (ICU)		
Yes	27	25.2
No	80	74.8

Vitamin D deficiency was found among 55 (51.4%) patients in which most of the patients were serious ill those received anesthesia. (table 2)

Among 55 cases of vitamin D deficiency, majority of the cases had severe coronavirus disease found in 43 (78.2%) cases. (table 3)

We found that 33 (30.8%) patients were died in which most of the patients. Patients with covid-19 disease who had low vitamin D levels had a higher mortality rate than those who had normal vitamin D levels, according to a study that was statistically significant at the 0.04 level of significance.(table 4)

Table 2: Prevalence of vitamin D deficiency

Variables	Frequency	%age
Vitamin D Deficiency		
Yes	55	51.4
No	52	48.6
Vitamin D insufficiency		
Yes	25	23.4
No	82	76.6

Table 3: Severity of covid-9 and vitamin D deficiency

Variables	Frequency	%age
Covid-19		
Severe	43	78.2
Mild	8	14.5
Moderate	4	7.3

Table 4: Prevalence of mortality with vitamin D deficiency and Covid-19

Variables	Frequency	%age
Mortality		
Yes	33	30.8
No	74	69.2
Vitamin D deficient		
Yes	29	27.1
No	4	3.7

## DISCUSSION

Because of how quickly SARS-CoV-2 evolved, our investigation into possible causes of severe clinical outcomes and higher morbidity and mortality rates was spurred on [13]. [12,13] SARS-CoV-2-infected patients who were either mildly or severely afflicted COVID-19 cases, with the latter having been admitted to the hospital due to varying degrees of respiratory insufficiency, were studied for 25OHD levels in this context..

One hundred and seven cases with coronavirus disease were presented in this observational study. 33.07±12.87 years were the mean age of the patients with mean BMI 23.01±6.32 kg/m<sup>2</sup>. Among 107 cases, most of the patients were males 67 (62.6%). It was found that the results of this investigation were in line with those of previous studies. [14,15] 42 (39.3%) cases had urban residency and majority of the patients had poor socio-economic status 77 (71.9%). Previous some studies presented same findings in which most of the cases of pandemic disease had poor socio-economic status.[16] General anesthesia was used among 25.2% cases which were severe ill and was unable to breath because of chest pain.

More than half of the 55 (51.4%) patients who received anaesthesia were found to have a deficiency in vitamin D. A recent study found a correlation between the prevalence and severity of COVID-19 and 25(OH) vitamin D levels in the blood. [17] Because these findings corroborate previous similar studies, it appears that vitamin D deficiency is associated with poor clinical outcomes in COVID-19 patients, regardless of the presence of inflammatory markers (such as IL-6 and CRP), age, or the presence of major comorbidities (such as obesity, diabetes, and hypertension) that are commonly observed in hospitalised COVID-19 patients as a whole. [18,19] Another research discovered that 25OHD levels may be connected to the number of COVID-19 cases in Europe [20] by looking at connections in previous studies, such as the one between the chance of getting SARS-CoV-2 and latitude [21]. According to the results of the study, SARS-CoV-2 positive patients had considerably lower vitamin D levels than SARS-CoV-2 negative patients, indicating a relationship between low vitamin D levels and SARS-CoV-2 positivity. [22]

Among 55 cases of vitamin D deficiency, majority of the cases had severe coronavirus disease found in 43 (78.2%) cases. We observed that 33 (30.8 percent) of the patients had passed away, with the majority of those who died being female. Several studies, including one that was statistically significant at the 0.04 level of significance, have found that individuals with covid-19 disease who have low vitamin D levels die more frequently than those who have healthy vitamin D levels. In addition, vitamin D has been demonstrated to have an influence on a wide variety of pathophysiological processes, making it feasible to avoid anti-Sars-CoV-2 infection by the use of vitamin D supplements. Due to the fact that vitamin D (via its receptor) can have a direct influence on a variety of pathways, understanding the function of vitamin D in the course and severity of SARS-CoV-2 infection is crucial. [23]

According to our extensive analysis, using vitamin D supplements may aid in the prevention of the spread of COVID-19. Getting adequate sunshine is particularly crucial in countries where vitamin D deficiency is frequent. As a consequence of the investigation, researchers discovered that individuals with covid-19 illness who had a p-value less than or equal to 0.05 died more often than those who did not have a significant vitamin D deficit. Vitamin D supplements may be effective in preventing anti-Sars-CoV-2 infection since vitamin D has been proven to have an influence on a range of pathophysiological processes. Understanding the function of vitamin D (through its receptor) in the course and severity of SARS-CoV-2 infection is crucial to understanding the virus itself and its transmission. [24]

## CONCLUSION

In this study, we came to the conclusion that patients with severe coronavirus disease who also had vitamin D deficiency had a higher rate of mortality.

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