

VITAMIN D LEVELS IN COVID 19 PATIENTS AT TERTIARY CARE CENTER AND ITS SIGNIFICANCE-AN HOSPITAL BASED STUDY



General Medicine

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ABSTRACT

Vitamin D deficiency and requirement has raised many eyebrows due to SARS CoV2 pandemic globally. The prevalence of Vitamin D deficiency has been reported by most of the studies world wide. It is prevalent in all the age groups and no such labelled high-risk groups. With the consequences of Vitamin D deficiency few studies reported that Covid-19 cases severity also increases or recovery is delayed. We did this study to assess the importance of Vitamin D levels sufficiency in management of Covid 19. **MATERIAL AND METHODS:** It's a prospective cohort study conducted at Mamata Academy of medical sciences, Bachupally, Hyderabad from April 2020 to September 2020. Its involved of 170 patients who admitted at our hospital and selected all admission cases and arranged them into 3 Groups based on the Vitamin D levels. **RESULTS:** We noticed here only 16.17% were in Mild, 60% are Moderate and 17.64% and 1.4% are very severe category of the total Vitamin D deficient patients. 29% are in Mild, 45% are in moderate 16% and 8% are severe and very severe category. Whereas 66% are mild 22% are moderate and 11% are severe and no one is in very severe category of all Normal Vitamin D levels. These reports also showed Normal Vit D level people are mostly of Mild Category of disease people and that is 66% which is more than any other 2 categories of patients too. **CONCLUSION:** We conclude that Vitamin D deficiency or insufficiency persons are more prone for Covid 19 severe infection and also took prolonged time to recover. Until there is more scientific evidence for vitamin D, we strongly endorse avoidance of vitamin D deficiency.

KEYWORDS

COVID-19, Vitamin D, SARS COV 2

INTRODUCTION

A new sudden storm to the entire world is COVID-19 (Coronavirus disease 2019) is caused by the SARS-COV-2 is described with severe acute respiratory syndrome coronavirus 2 as its ism similar to the existing SARS infection. Total infected patients are 77.4 million and deaths reported are 17 million all over the world till date.¹ Where as in India it is 10.1 million and 146000 deaths respectively till date. It challenged the entire world health systems with lack of evidence with very rapid spread pandemic in nature and higher mortality than any other pandemic till date. So various treatment trials based on the presentation and complications are tried worldwide.

Among those various trials tried over the world Vitamin D treatment has been identified as a potential strategy to prevent COVID-19 complications and severity of the disease.² Vitamin D treatment has been established to improve the outcome of various viral respiratory infections.³ Vitamin D deficiency is very much common in the entire world. In India also previous studies proved that most of the Indians are Vitamin D deficient. The reasons established previously are reduced sun exposure due to urbanization as it caused people for prolonged in door stay and also its high in health care workers too.⁴ COVID-19 is less prevalent in pregnant women and children⁵ and in in whom rates of vitamin D deficiency are lower⁶⁻⁸

Vitamin D is also referred as steroid hormone, present in limited dietary sources. For most, the major 'D' source is skin exposure to UVB in sunlight, which waxes and wanes seasonally. Supplementation is the only other option. 'D' with 50 metabolites [9] is more useful and Sensible 'D' supplementation has a proved record.[10]

Given the low risks and low cost of vitamin D treatment, recent reporting has suggested that vitamin D treatment should be scaled.^{11,12} Nevertheless, evidence of whether vitamin D deficiency is associated with COVID-19 infection and whether vitamin D treatment may help

decrease the burden and spread of COVID-19 is lacking.

The onset of symptoms, including fever, headache, dry cough, myalgia, and diarrhea, typically develops within 3-7 days.^{13,14} Severe cases can progress to acute respiratory distress syndrome (ARDS), typically 8-9 days after the exposure to infection.¹⁵ ARDS has been shown to induce widespread cytokine release leading to cytokine storm and symptoms of sepsis with multiorgan failure that often involves the pulmonary system with mechanical ventilation required and eventually death.^{15,16} These patients exhibit higher blood plasma levels of proinflammatory cytokines, notably interleukin-6 (IL-6). Activation of the vitamin D receptor, expressed on monocytes, dendritic cells, and macrophages, has been shown to directly reduce the secretion of inflammatory cytokines (IL-6) and indirectly affect CRP, reducing damage to other organs.¹⁷

IL-6 is a mediator of fever and the acute phase response. Part of its proinflammatory effect is through induction of C-reactive protein (CRP).¹⁸ Higher levels of IL-6 predict poorer clinical outcomes in patients with ARDS.¹⁹ Studies demonstrated that vitamin D administration significantly reduced levels of IL-6 and mortality in patients with ventilator-associated pneumonia.²⁰

METHODS

We included 170 Covid-19 patients admitted in Mamata Academy of Medical Sciences, Hyderabad between April 2020 to October 2020 in this study. It's a tertiary care center and Govt Of India recognized COVID center. We confirmed the patients as Covid +Ve with RT PCR test report. We took history of 1-3 months regarding Vitamin supplements and collected the reports for cross verification of their Vitamin D status. We tested all the RT PCR +Ve patients for Vitamin D levels on the Day of admission. We used Mindray CL1000i equipment for Vitamin D levels measurement. The method we used is Chemiluminescence immunoassay (CLIA) with Mindray CLIA kits. We

included children above the age of 10 years and pregnant women also.

Including Criteria

1. RTPCR +Ve
2. RT PCR -Ve with HRCT CHEST shows CORADS stage V findings and in ARDS

Excluding Criteria

1. RT PCR -Ve and with out any HRCT CHEST Findings
2. Childrens aged <10 Years

RESULTS

We collected the Vitamin D levels on Day 1 or 2 of admission and started supplementation as per requirement based on the category they belong for both deficient and insufficient patients also. We continued for them those who are already on treatment. We compared these patients with normal level patients who are not given any supplements. The results we noticed are as follows

Vitamin D levels and Classification

<20 ng/ml	Deficiency
20-30 ng/ml	Insufficiency
30-100 ng/ml	Normal

Table 1. Statistics of Vitamin D levels with Sex

Vitamin D category	Male	Female	Total
Deficiency	84	51	135
Insufficiency	14	9	23
Normal	07	02	09

In this study a total of 170 Covid 19 patients were included. Among those 49.41% (84) Male and 30% (51) Female are vitamin D deficient. The patients who are under insufficient category are 8.2% (14) are Male and 5.2% (9) are Female. Patients who have normal Vitamin D levels 4.1% (7) are Male 1.1% (2) are Female respectively.

Table 2. Hospital stay details in comparison with normal people

Category	0-5 days	5-10 days	>10 days
Deficient	36	84	14
Insufficient	09	10	04
Normal	06	02	01

We analyzed the patients in to 3 groups based on their length of stay and severity of the condition. Among these Vitamin D deficient Category patient who stayed ≤ 5 days are 26 % and 62.68% stayed between 5-10 days 10.44% are > 10 days .From Insufficient Category 39 % stayed ≤ 5 Days, 43.47 % 5-10 days and 17.39% >10 days respectively. Under Normal category mostly 66% (06) are less than 5 days stay 22.22% and 11.11% are more than 10 days stay. This results showed that Vitamin D normal group people are less risky for Covid-19 and recovered early than other group patients.

Table 3. Disease nature based on respiratory condition

Category	No Oxygen requirement (Mild)	Continuous O2 requirement (Moderate)	HFNO Requirement (Severe)	Ventilator requirement (Very Severe)	Mortality
Deficient	22	82	24	08	01
Insufficient	07	11	04	02	00
Normal	06	02	01	00	00

We divided the patients in to 4 types based on the condition of the patient like Mild, Moderate, Severe and Very severe especially based on their respiratory condition and need of Oxygen therapy like continuous through nasal prongs or High flow nasal oxygen or Ventilator requirement. We included C Pap required patients also under HFNO category. We also considered other parameters like D-Dimer, Serum ferritin, IL-6 Levels to categorize the same which we didn't mention here. We noticed here only 16.17 % were in Mild, 60% are Moderate and 17.64% and 1.4% are very severe category of the total Vitamin D deficient patients. 29% are in Mild, 45% are in moderate 16% and 8% are severe and very severe category. Whereas 66% are mild 22% are moderate and 11% are severe and no one is in very severe category of all Normal Vitamin D levels. These reports also showed Normal Vit D level people are mostly of Mild Category of disease people and that is 66% which is more than any other 2 categories of patients too.

DISCUSSION

In view of sudden pandemic there are no much studies in this regard and no much evidence also available. This study is first of its kind is purely based on our hospital patients. Initially we categorized patients in to 3 categories based on Vitamin D levels. Then we monitored same patients to assess the severity of the disease. Our study shows that those who are Vitamin D deficient are more risk for Covid infection and also took more time to recover. We also noticed they are more prone for severity of the disease. Most of the Deficient category and Insufficient category patients are stayed longer time and needed either continuous requirement / HFNO / Mechanical ventilation. Whereas from Normal Vitamin D levels group no patients required Mechanical ventilation and very few patients required O2 requirement either in the form of continuous or HFNO. We also recorded one death from the Vitamin D deficient category. A retrospective analysis of 3,48,598 UK biobank participants showed a higher chance of SARS-CoV-2 in subjects with lower levels of 25(OH)D²¹ and Adrian R Martineau, Nita G Fourouhi, et al. Vitamin D for COVID-19: A case to answer? results are on par with our study. Whereas a study by Sunali Padhi,¹ Subham Suvankar et al. showed contrast result that is Vitamin D levels are inverse related with COVID 19 which is majorly an analytical study of data available over GOVT of India websites²³. A brief report given by Susan A Lanham-New¹, Ann R Webb², Kevin D Cashman³, Judy L Buttriss⁴, et al. on Vitamin D and SARS-CoV-2 virus/COVID-19 disease also similar to our results²⁴. This study has limitations that these results are only because of Vitamin D levels or due to any other causes also need to be evaluated.

CONCLUSION

We conclude that Vitamin D deficiency or insufficiency persons are mostly suffered lower respiratory tract infection either in the form of ARDS or consolidation. They are more prone for Viral Infections and also took prolonged time to recover. Until there is more scientific evidence for vitamin D, we strongly endorse avoidance of vitamin D deficiency in the population and complete adherence to government's advice worldwide. We await for further extensive studies and also we need cross sectional analysis of the other factors like Co morbid conditions, Age factors and the complete SARS COV-2 disease analysis to prove the same.

Disclosures

The authors report that no conflicts of interest during this study.

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