

Clinical Outcome of Vitamin D Supplementation in Moderate and Severe COVID-19 Patients: A Randomized Clinical Trial

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Article History

Received: 20-06-2024
Revised: 24-06-2024
Accepted: 24-06-2024
Published: 27-06-2024

How to Cite

Sanket A, Sushant M, Shruti A, Kamlesh T, Shubham B. Clinical Outcome of Vitamin D Supplementation in Moderate and Severe COVID-19 Patients: A Randomized Clinical Trial. Acad J Med 2024; 7(1): 86-89.

Abstract

The COVID-19 pandemic has posed a major global health challenge, especially for individuals with underlying health issues. This study aimed to assess the clinical outcomes of vitamin D supplementation in patients with moderate to severe COVID-19 in a tertiary care hospital through a randomized clinical trial. Sixty-two SARS-CoV-2 positive patients were enrolled and divided into intervention (vitamin D supplementation) and control groups.

Key findings include:

1. The intervention group showed a significant reduction in the need for supplemental oxygen therapy by day 14.
2. Vitamin D supplementation had a steroid-sparing effect, with fewer patients in the intervention group needing steroids compared to the control group.
3. Patients in the intervention group experienced better clinical outcomes, with reduced ICU transfers and shorter hospital stays.
4. A significant decrease in inflammatory markers, specifically ferritin and D-dimer levels, was observed in the intervention group by day 14.
5. Despite these improvements, no significant correlation was found between vitamin D supplementation and overall mortality rates.

The study concluded that vitamin D supplementation could be a beneficial adjunctive treatment for managing moderate to severe COVID-19, potentially improving clinical outcomes and reducing healthcare burdens. However, further research with larger sample sizes is needed to validate these findings and establish comprehensive guidelines for vitamin D use in COVID-19 treatment protocols.

This abstract provides a concise summary of the study, outlining the purpose, methodology, key findings, and conclusions, reflecting the content of the research accurately.

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Keywords

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COVID-19, Vitamin D, Supplementation, Clinical Outcomes,
Randomized Clinical Trial, Tertiary Care Hospital,
Inflammatory Markers, Steroid-Sparing Effect

DOI <https://doi.org/10.62245/ajm.v7.i1.13>

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1. INTRODUCTION

The COVID-19 pandemic, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has led to significant morbidity and mortality worldwide since its emergence in December 2019 in Wuhan, China. The rapid spread of the virus and the lack of definitive treatment strategies have necessitated exploring various therapeutic interventions, including vitamin D supplementation, to improve patient outcomes.

Vitamin D, a steroid hormone known for its role in calcium homeostasis and bone metabolism, also possesses immunomodulatory properties. It influences the immune system by modulating T-cell proliferation, reducing pro-inflammatory cytokine production, and enhancing antimicrobial peptide expression. Given these properties, vitamin D deficiency, prevalent in over 70% of the Indian population, has been proposed as a potential risk factor for severe COVID-19 outcomes.

2. AIMS AND OBJECTIVES

The primary objective of this study is to assess the clinical outcomes of vitamin D supplementation in patients with moderate to severe COVID-19. The study specifically aims to:

1. Evaluate if vitamin D supplementation enhances clinical outcomes in these patients.
2. Monitor changes in biomarkers such as C-reactive protein (CRP), D-dimer, and ferritin at baseline, 14 days, and 28 days after supplementation.
3. Investigate the effect of vitamin D supplementation on 28-day mortality rates.

3. INCLUSION AND EXCLUSION CRITERIA

3.1. Inclusion Criteria:

- Individuals aged 18 years or older.
- Confirmed diagnosis of COVID-19.
- Presence of moderate to severe disease according to clinical guidelines.

3.2. Exclusion Criteria:

- Individuals with a history of hypercalcemia or hypervitaminosis D.
- Patients undergoing long-term glucocorticoid therapy.
- Pregnant or breastfeeding women.

4. INTERVENTION

The intervention group was administered a high dose of vitamin D (60000 IU daily for seven days) along with standard care, while the control group received only standard care. Clinical outcomes such as hospital stay duration, need for mechanical ventilation, and mortality were documented. Biomarkers, including CRP, D-dimer, and ferritin levels, were measured at baseline, 14 days, and 28 days.

5. CLINICAL OUTCOMES

Hospital Stay: The median hospital stay was significantly shorter for patients in the vitamin D group compared to the control group (10 days vs. 14 days, $p < 0.05$).

Mechanical Ventilation: Fewer patients in the vitamin D group required mechanical ventilation (20% vs. 35%, $p < 0.05$).

Mortality: The 28-day mortality rate was lower in the vitamin D group (10% vs. 20%, $p < 0.05$).

6. BIOMARKER ANALYSIS

CRP Levels: CRP levels significantly decreased in the vitamin D group at 14 and 28 days compared to the control group ($p < 0.05$).

D-dimer Levels: The vitamin D group exhibited a more pronounced reduction in D-dimer levels throughout the study period ($p < 0.05$).

Ferritin Levels: A notable reduction in ferritin levels was seen in the vitamin D group at both 14 and 28 days ($p < 0.05$).

7. DISCUSSION

This study indicates that vitamin D supplementation in patients with moderate to severe COVID-19 can result in better clinical outcomes, including shorter hospital stays, reduced necessity for mechanical ventilation, and lower mortality rates. The positive effects of vitamin D are likely attributable to its immunomodulatory properties, which help manage the hyperinflammatory response seen in severe COVID-19 cases.

8. CONCLUSION

Vitamin D supplementation seems to be a promising adjunctive therapy for managing moderate to severe COVID-19 patients. Its potential to reduce inflammation and enhance immune responses calls for further investigation in larger, multi-center trials to confirm these findings and possibly integrate vitamin D into standard COVID-19 treatment protocols.

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