

Vitamin D Assessment in Recovered COVID-19 Patients

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ABSTRACT

Abbreviations: Covid-19: 2019 Coronavirus Disease; DBP: Vitamin D-Binding Protein; RCT: Randomised Controlled Trial; FIA: Fluorescence Immunoassay; CI: Confidence Interval; SARS: Severe Acute Respiratory Syndrome

Introduction

The World Health Organization has classified the 2019 coronavirus disease (Covid-19) as a global pandemic. It is an illness caused due to severe acute respiratory syndrome. This disease has originated from Wuhan city of China. Three broad measures like tracing, testing and treatment which India has strategically adopted to combat COVID-19 pandemic and this have been globally appreciated. It is a proactive exercise to protect the whole nation against menace of corona effect. During lockdown, three significant measures- quarantine, isolation and social distancing are employed to restrict population mobility and thus, prevent community level spread of Covid-19. Quarantine management is the first step of restricting the movements of people who have been exposed to this infectious disease. These measures are supposed to have kept the number of cases low and help many corona-infected patients to recover. As on 8th Sept., 2020 across India, 3323950 COVID-19 patients have recovered out of 4280422 confirmed cases (as per Aarogya setu app., dated 8th Sept., 2020 at 1045 hrs, IST). The present recovery rate of COVID-19 is more than 75% in India.

Various studies with regard to clinical and laboratory profile of the Covid-19 patients have been studied as an effort to gain knowledge towards the ultimate goal of containing this pandemic [1-3]. Further, social distancing by means of quarantine and isolation for a considerable duration may result in substantial psychological consequences, lifestyle changes such as reduced physical activity and unhealthy diet; all these could impact the well-being of persons [4]. Coronavirus disease is an illness of upper respiratory tract. Vitamin D has been studied for its association with upper respiratory tract infection [5]. The majority of COVID-19 infected people exhibit mild to moderate respiratory illness and recover without the need for special care. During COVID-19 pandemic, the British Govt. has recommended for vitamin D supplements throughout summer and autumn for its people. Serum levels of 25-hydroxyvitamin D, which measure both free 25 (OH) and vitamin D-binding protein (DBP), are used to determine the vitamin D status of an individual. Low levels of vitamin D in the blood are considered deficient, while levels between 10 and 30 ng/ml and levels over 30 ng/ml are regarded as insufficient and sufficient, respectively.

In a study on animal, it was observed that decreased vitamin D is associated with negative CNS effects [6]. Vitamin D receptors and activating enzymes, which are involved in glucocorticoid signalling in hippocampus cells, are predominantly found in the hypothalamus and substantia nigra. Further, the correlation has been observed between low vitamin D levels and major depression [7]. In a randomised controlled trial (RCT) study involving overweight and obese participants, it was found that depression was alleviated by raising vitamin D status; lower vitamin D levels were associated with higher levels of depression, and supplementation with the vitamin led to significant improvements in depressive symptoms after a year [8]. Another study revealed that people having less than 20 ng/ml 25 (OH) vitamin D have higher incidence of mood disorders [9]. In fibromyalgia, anxiety and depression is associated with low vitamin D [10]. Recently in a study, vitamin D role in prevention of COVID-19 infection and mortality was observed [11]. Recent study reported that vitamin D has role in prevention, progression and severity of COVID-19 infection [12]. However, no evidence about protection from second infection of COVID-19 recovered patients is available who have developed antibodies against this infection. The studies on recovered COVID-19 patients are meagre and needs to be explored.

Hence, in view of above assertions about vitamin D, it is envisaged to have an observational assessment of vitamin D status on recovered COVID-19 individuals, who are advised to stay at home at least for another fourteen days after treatment recovery from the hospital.

This study will figure out an understanding between vitamin D status and behavioural changes in recovered COVID-19 patients, who have contracted the COVID-19 infection, underwent the treatment and advised further home stay after recovery. To the best of our knowledge, no published reports on COVID-19 recovered patients and vitamin D have been published. Our observational study was conducted among COVID-19 recovered patients (n=30) who were advised home stay after successful clinical management at COVID-19 dedicated hospitals. The healthy subjects (n=30) who were at home stay during lock-down period served as control group. The study was conducted using the left-over blood samples (50µl) of recovered COVID-19 patients collected during validation of antibody based sero-diagnostic test kits of China as per directives of ICMR, New Delhi. The samples were taken from districts of Siwan and Patna of Bihar state. The informed consents were obtained from healthy subjects as well as the COVID-19 recovered individuals for using their left over blood for research purpose. The serum assessment of 25(OH) vitamin D was measured following leaflet insert of Boditech Med Inc., Republic of Korea on ichroma-IITM automatic analyzer, Republic of Korea based on fluorescence immunoassay (FIA) technique. The study revealed that mean level of vitamin D among COVID-19 recovered was significantly lowered as compared to healthy individuals (p=0.0001). The mean levels (Mean \pm S.D.) of vitamin D were 18.16 \pm 3.15 ng/ml and 36.24 \pm 18.90 ng/ml respectively. The 95% Confidence Interval (CI) for COVID-19 recovered was 16.98-19.34 while for healthy individuals was 29.18-43.30. The whisker box plot analysis is detailed below in (Figure 1).

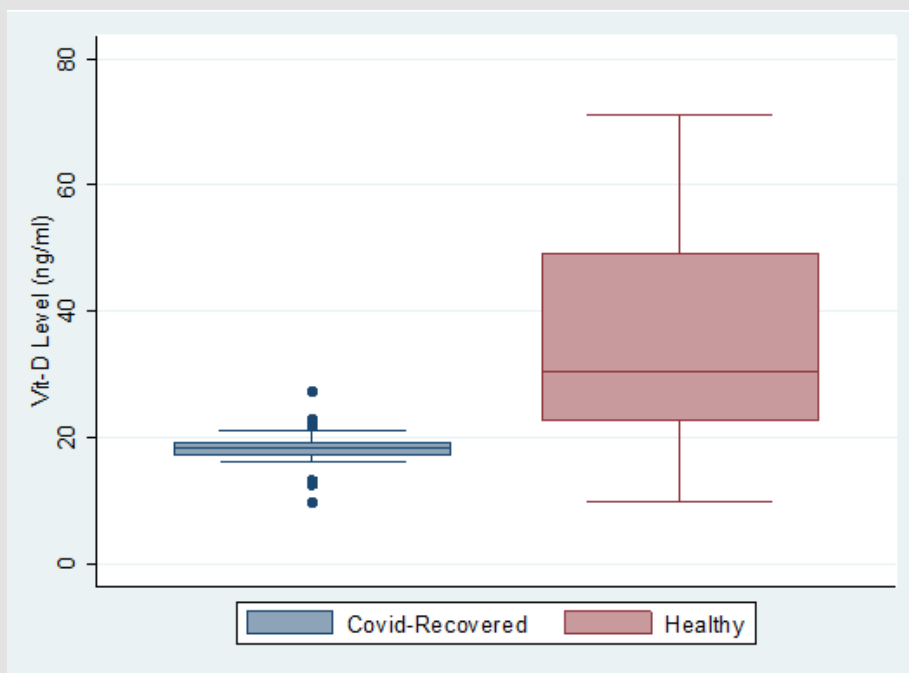


Figure 1: Whisker box plot of vitamin D levels in COVID-19 recovered and healthy individuals.

The recovered COVID-19 patients do develop antibodies for COVID-19 but no evidence is available till date how long these antibodies will help those recovered individuals from re-infection. The severe acute respiratory syndrome (SARS) patients lose their neutralizing antibodies within a few years but those with severe disease, the antibodies lasts for 12 years after infection. However, as of now, no evidence of re-infection has been validated for COVID-19. The theories on when antibodies disappear in mild and asymptomatic disease people are pure guesswork. The levels of neutralising antibodies needed to prevent re-infection or reduce COVID-19 symptoms in a second illness are also unclear. Under the above circumstances, our observational report on vitamin D among recovered COVID-19 will provide insight to tackle those individuals from re-infection or behavioral point of view.

In conclusion, the study showed insufficient vitamin D levels among recovered COVID-19 patients in comparison to healthy individuals. Further thorough research is necessary to determine the precise nature of the link between vitamin D, anxiety, depression, and behavioural changes in those who have recovered from the COVID-19 pandemic. Despite the powerful benefits that have so far been reported, much is still unknown about vitamin D. The physiological benefits of vitamin D are considerable, and it may also have behavioural effects.

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Conflict of Interests

None.

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