

Comparison of Vitamin D, Interleukin-6, and Interleukin-8 Levels in Covid Positive patients with or without Cytokines Storm

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ABSTRACT

Background: Currently world is within the clutches of the coronavirus disease (COVID-19), caused by the SARS-CoV-2 virus, COVID-19 virus has evolved to human-to-human spread. COVID-19 infection can cause fever, fatigue, dry cough, severe pneumonia, respiratory distress syndrome and in some instances death. Release of cytokine is the main process by which COVID-19 affects human system. High level of chemokines and pro-inflammatory cytokines has been observed among the patients with COVID-19.

Methodology: 100 COVID-19 positive patients with cytokine storm and 100 COVID-19 positive patients without cytokine storm with 18+ age and both gender were included after their formal consent. Interleukin-6, interleukin-8 and Vitamin-D were determined by their respective ELISA kits. SPSS software was applied for statistical analysis.

Results: the results of current study showed the raised levels of interleukin-6 and interleukin-8 in case group as compared to controls. Levels of Vit D were compromised in case of Covid patients with cytokine storm than controls respectively.

Conclusion: it was concluded that increased oxidative stress and lacking anti-oxidants may add to the development and advancement of cytokine storm in corona virus positive patients.

Keywords: Vitamin D, Transforming growth factor beta, SARS-COV2, IL-6, IL8, SOD, cytokine storm.

INTRODUCTION

Corona virus disease 2019 also named as COVID-19 is novel respiratory tract viral infection caused by newly discovered SARS-CoV-2 virus. It is typically presented with the symptoms of pneumonia including dry cough, dyspnea, fatigue, fever, myalgia as well as loss of taste and smell sensation. It is a mild disease which can be cured on its own, however, in some people particularly old-aged, truncated or compromised immunity and people having some underlying pathology such as cardiovascular, diabetes, respiratory disease etc., it can shift towards severe disease and death¹.

The COVID patients underwent inflammatory cytokines storm show the production and progression of acute respiratory distress syndrome (ARDS) that may leads to an aggravation of cytokines release, that ultimately result in macrophage activation following the recruitment of WBCs, prompting an scarce response². Vitamin D also known as sunshine vitamin, deficiency is considered to be a health problem worldwide. In 2008, one billion people all around the world is estimated to suffer from vitamin D deficiency³. The deficiency of vitamin D in body may causes the delayed response of immune system and become more vulnerable to infectious diseases especially lower respiratory tract infections. During first wave of SARS-COV, supplementation of vitamin D supplementation control inflammatory respiratory response⁴. For the increasing cellular immunity in body, vit D has a great role in decreasing the risk of cytokine storm with innate immunity. Vitamin D is connected to an assortment of COVID-19 risk factors.

Vitamin D inadequacy is combined with cutting edge, heftiness, hypertension, age, male sex, fixation in coagulopathy, and northern environments, which are all identified with more unfortunate results. With an expanded period, convergences of dynamic vitamin D reduction account for less daylight openness and diminished creation of 7-DHC inside the skin. It may likewise incompletely clarify why the death rate of COVID-19 is higher in more seasoned grown-ups. There's additionally an all-around archived move inside the framework towards a favourable to

provocative state in more seasoned adults (known as 'inflammation'), which brings about constant second-rate aggravation, a delicate collection of organic injury, and in the long-run movement of ongoing infection⁵. It's been shown that vitamin D is identified with expanded mitigating and diminished support of fiery cytokines in more seasoned grown-ups. The positive impact of vitamin D is valuable during cytokine storms, applicable to COVID-19 patients with ARDS⁶.

The objective of the study was to investigate the interrelationship of vitamin D, interleukin-6 and interleukin-8 in COVID-19 positive patients with or without cytokine storm.

METHODOLOGY

The present study was designed to investigate the interrelationship of vitamin D, interleukin-6 and interleukin-8 in COVID-19 positive patients with or without cytokine storm. All the selected patients were screened at The University of Lahore teaching hospital, Lahore. Informed consent was obtained from every patient prior to the study. There were hundred clinically apparently healthy individuals included in control group. The experimental research protocol was approved by the Ethical Committee of The Institute. Sample of venous blood (5ml) were taken from the anti-cubital vein. Within first one hour of collection the sample bottles were centrifuged, followed by the serum separation and storage at -70°C until assayed. The IL-6 was assayed by the quantitative ELISA method as protocols is given by their manufacturers'. The IL-8 was assayed by following same procedure as for IL-6. The vitamin-D was assayed by the quantitative ELISA as protocol mentioned by their manufacturers' protocols. Independent sample t test was applied to compare the results of different variables. Independent sample t test was applied to compare the results of different variables.

RESULTS

The total of hundred COVID-19 confirmed positive patients with cytokine storms and hundred control subjects of COVID-19 positive without cytokine storm were included in the study for the

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analysis of interrelationship of interleukin-6, interleukin-8 and vitamin D with or without cytokine storm.

Table 1: The Inflammatory and Antioxidant Biomarkers Profile of Covid-19 Patients Vs Control:

Variables	Control (n=100)	Subjects (n=100)	P (≤ 0.05)
IL-1 (pg/ml)	28.41 \pm 11.33	107.76 \pm 43.50	<0.001
IL-6 (pg/ml)	7.23 \pm 2.60	49.45 \pm 28.05	<0.001
IL-8 (pg/ml)	39.69 \pm 18.16	92.73 \pm 29.26	<0.001
TGF- β (pg/ml)	12.80 \pm 6.140	20.40 \pm 6.10	<0.001
Vitamin D	17.29 \pm 3.29	13.29 \pm 1.29	0.03
MDA (nmol/ml)	1.40 \pm 0.349	6.40 \pm 0.89	0.003
SOD (IU/ml)	1.17 \pm 0.13	0.33 \pm 0.02	0.04

DISCUSSION

The current study has investigated the assessment of levels of serum in cytokines as well as vitamin-D of COVID-19 patients. Cytokines and their receptors have an important part in developing disease. Role of cytokines involved in the severity of COVID-19 infection is evident from the present study. COVID-19 patients have shown aggravated levels of TGF- β , IL-1, IL-6, and IL-8 as compared to normal individuals.

Interleukin-1 (IL-10 is a pleiotropic cytokine that regulates many life processes. The recent studies showed that IL-1 along with its negative regulator IL-1Ra is involved in the progression of COVID, that contribute to over expression of inflammatory mediators. COVID is a global ongoing pandemic that has affected young and old with diverse consequences that can be hazardous⁴. The COVID-19 characterized a violent inflammatory response that could involve many vital organs of the body especial lungs that caused huge damage due to severe lung inflammation (8). Vit D harmonizes adaptive immune responses. Vit D perform a vital role in lessening creation Th1 which includes tumor necrotic factor, interferon, interleukin-6, thus lessening Th1 mediated autoimmunity. The fusion of Th2 cells and their cytokines, interleukin 4, 6, and 8 is influenced by 1, 25 hydroxyl D3 radical. Furthermore, Vitamin D not only increases the creation of T regulatory cells but also lessens IgG creation and impedes dendritic cell differentiation⁹. Vit D has manifested an important role not only in increasing innate immune response but also implement resistance to a sprinting immune response. It highly recommends that to have appropriate serum levels of Vit D can save patients in opposite to the most frightful hurdle and death from SARS-CoV-2⁹ which is also shown in our study.

CONCLUSION

This study concluded that cytokine storm and ARDS in SARS-COV2 is directly related through the degree of oxidative stress damage and inflammatory cytokines such as TGF beta and interleukins and inversely related with anti-oxidants such as

superoxide dismutase. A decrease in anti-oxidant causes imbalance between pro oxidants and anti-oxidants. Vitamins D also acts as anti-oxidants which moderately protect against SARS-COV2 as we have seen the subjects had low blood level of vitamin D in compare to control groups. So, any deficiency in vitamin D can also cause cytokine storm in new corona virus strain.

Conflict of interest: Nil

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