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ORIGINAL ARTICLE

Comparison of Vitamin D Level among Vaccinated and Non Vaccinated Pregnant Women with Covid-19

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ABSTRACT

Objective: The aim of this study is to compare the vitamin D level among vaccinated and non-vaccinated pregnant women with COVID-19.

Study Design: Observational/comparative study

Place and Duration: The study was conducted at the department of Gynae and Obs Quaid-e-Azam International Hospital, Islamabad and Qazi Hussain Ahmad Medical Complex, Nowshera for Duration of six months from October 2020 to March 2021.

Methods: Total 120pregnant women had coronavirus disease were presented. Informed written consent was taken for details demographics age, gestational age, parity and body mass index. 18-45years was the women ages. Patients were categorized into 2-groups. Group I had 60 vaccinated patients and in group II 60 non-vaccinated pregnant women. Blood sample of all the patients were taken for the level of serum 25-hydroxy vitaminD3 [25 (OH) D3]. Vitamin D deficiency was calculated and compared among both groups. Sufficient serum vitamin D level was considered >30ng/ml. SPSS 23.0 version was used to analyze complete data.

Results: In group I age was 28.4±8.55 years with mean BMI 24.08±1.18 kg/m^2 and in group II age was 27.41±6.37 years with mean body mass index 23.12±4.42 kg/m^2. Mean gestation age in group I was 33.12±9.42 weeks and in group II mean gestational age was 34.07±5.63 weeks. Mean parity in group I was 3.88±7.27 and in group II 4.01±4.14 was mean parity. We found 28 (46.7%) primigravida cases in I-group and 30 (50%) primigravida females in II-group. In group I 51(85%) patients had vitamin D deficiency and in group II 54 (90%) had deficiency of vitamin D. Among 51 deficient women of group I, number of severe deficiency (<10ng/ml) women were 8 (13.3%), deficiency (10-20ng/ml) were 13 (21.7%) and not-sufficient (20-30ng/ml) were 30 (50%) and in group II prevalence of severity (<10ng/ml) patients were 10 (16.7%), deficient cases (10-20ng/ml) were 15 (25%) and not-sufficient cases (20-30ng/ml) were 29 (48.3%). Deficient vitamin D serum levels were 15.01±1.22 in group I and 14.34±4.12 in group II.

Conclusion: In this study we concluded that prevalence of vitamin D deficiency was highly among pregnant women and most probably in non-vaccinated pregnant patients but did not find any significantly difference among both groups.

Keywords: Pregnancy, COVID-19, Vitamin D, Vaccination

INTRODUCTION

Factors such as age, co-morbidities, and viral load are important in determining the severity of SARS coronavirus-2 (SARS-CoV-2) infection [1. Researchers are focusing their efforts on strategies to control and prevent the immune system's response to coronavirus disease-2019 (COVID-19), since there is currently no treatment [2]. Recent years have seen a flurry of debate on contentious issues such as vitamin D levels and the COVID-19 gene variant.

Vitamin D's antiviral effects on SARS-CoV-2 infection may be due to its immunomodulatory and anti-inflammatory capabilities, according to research. Vitamin D, which has been demonstrated to reduce cytokine storm-related inflammatory responses in COVID-19 [2, 4], may slow down the progression of Coronaviruses.

Although a link between insufficiency and severity or fatality in 62 data sets from 20 European nations has not been proven, vitamin D supplementation is linked to an increased risk of SARS-CoV-2 infection.The SARS-CoV-2 pandemic has been demonstrated to be beneficial to the non-pregnant population that consumes appropriate vitamin D [5, 7-9]. Although vitamin D insufficiency may play a role even in the most severe and deadly instances of COVID-19. [10]

For optimal health, vitamin D, which is a fat-soluble vitamin and steroid prohormone, is required. As well as regulating calcium and phosphorus metabolism, vitamin D is essential for bone health and development. Vitamin D deficiency or insufficiency has been linked to a wide range of diseases and maladies, including heart disease and breast cancer, according to recent research. [11] When levels exceed 20ng/mL, they are declared deficient, while levels between 21 and 29ng/mL are deemed insufficient, and values between 30 and 100ng/mL are deemed acceptable. People of all ages are susceptible to vitamin D deficiency or insufficiency.Throughout the winter in Shanghai, women who have just gone through menopause are at danger of Vitamin D deficiency or dearth. Vitamin D deficiency or deficiency affects 88 percent of Beijing males. Pregnant women account for 86.6 percent of the population in the Southeast United States during the winter months. COVID-19 positive patients had significantly higher mean plasma 25(OH)D levels compared to COVID-19 negative patients. Food and sunshine absorption of vitamin D would be reduced during quarantine. Low levels of 25(OH)D are linked to an increased risk of infection and hospitalisation, according to the great majority of observational studies. Vitamin D insufficiency was linked to higher infection and death rates in European and Asian nations, according to data from Worldometer (infection and mortality statistics, as of December 31, 2020). In the elderly, pregnant women, and individuals with chronic renal disease, low levels of 25(OH)D are related with a higher risk of COVID-19 infection. COVID-19 patients are two times more likely than the overall population to have 25(OH)D deficiency [10, 12].

Low vitamin D levels have previously been linked to a greater incidence and more severe result of pregnancy issues such preterm delivery and preeclampsia, foetal growth restriction, gestational diabetes, newborn respiratory disease, autoimmune disorders, and autistic spectrum disorder. Although pregnancy increases a woman's chance of contracting COVID-19, the evidence for a link between vitamin D and COVID-19 is limited. [15]

Purpose of this study is to compare the vitamin D level among vaccinated and non-vaccinated pregnant women with COVID-19.

MATERIAL AND METHODS

This observational comparative study was conducted atthe department of Gynae and Obs Quaid-e-Azam International

Hospital, Islamabad and Qazi Hussain Ahmad Medical Complex, Nowshera for Duration of six months from October 2020 to March 2021.The study was comprised of 120 pregnant with corona virus disease.Informed written consent was taken for details demographics age, gestational age, parity and body mass index. Age of the patients was in18-45 years. Women had cardiac disease, severe other medical illness and those did not give any written consent were excluded from this study.

Enrolled patients were aged between 18-45years. Patients were categorized into 2-groups. Group I had 60 vaccinated patients and in group II 60 non-vaccinated pregnant women.Blood sample of all the patients were taken for the level of serum 25-hydroxy vitaminD3 [25 (OH) D3]. Serum 25-hydroxyvitamin D (25(OH)) concentrations were used to determine vitamin D status. We used an automated chemiluminescent immunoassay using an ids Holdings PLC kit to measure 25-VitD. Vitamin D deficiency was defined as a reading of less than 20 ng/mL (50–75 nmol/L) in the assay's measuring range. Those with readings above 30 ng/mL (75–250 nmol/L) were considered to have adequate vitamin D levels. Supplemental vitamin D insufficiency tests were conducted, with levels below 10ng/ml being classified as seriously deficient. Mean standard deviation was used and categorical variables were assessed by frequency and percentage.

RESULTS

In group I age was 28.4±8.55 years with mean BMI 24.08±1.18 kg/m^2 and in group II age was 27.41±6.37 years with mean body mass index 23.12±4.42 kg/m^2. Mean gestation age in group I was 33.12±9.42 weeks and in group II mean gestational age was 34.07±5.63 weeks. Mean parity in group I was 3.88±7.27 and in group II 4.01±4.14 was mean parity. We found 28 (46.7%) primigravida cases in I-group and 30 (50%) primigravida females in II-group.(table 1)

Table 1: Characteristics of enrolled pregnant women

Variables	Group I	Group II
Mean age (years)	28.4±8.55	27.41±6.37
Mean BMI (kg/m^2)	24.08±1.18	23.12±4.42
Mean gestational age (weeks)	33.12±9.42	34.07±5.63
Mean parity	3.88±7.27	4.01±4.14
Gravidity		
Primigravida	28 (46.7%)	30 (50%)
Multi-gravida	32 (53.3%)	30 (50%)

Table 2: Comparison of vitamin D deficiency among both groups

Variables	Group I (60)	Group II (60)
Vitamin D deficiency		
Yes	51 (85%)	54 (90%)
No	9 (15%)	6 (60%)
Mean Serum Level	15.01±1.22	14.34±4.12

Among 51 deficient women of group I, number of severe deficiency (<10ng/ml) women were 8 (13.3%), deficiency (10-20ng/ml) were 13 (21.7%) and not-sufficient (20-30ng/ml) were 30 (50%) and in group II prevalence of severity (<10ng/ml) patients were 10 (16.7%), deficient cases (10-20ng/ml) were 15 (25%) and not-sufficient cases (20-30ng/ml) were 29 (48.3%).(table 3)

Table 3: Association of vitamin D levels among both groups

Variables	Vaccinated (n=60)	Non-vaccinated n=60)
Levels of Vitamin D deficiency		
severely deficient (<10ng/ml)	8 (13.3%)	10 (16.7%)
deficient (10-20ng/ml)	13 (21.7%)	15 (25%)
insufficient (20-30ng/ml)	30 (50%)	29 (48.3%)
Total	51 (85%)	54 (90%)

In group I 51(85%) patients had vitamin D deficiency and in group II 54 (90%) had deficiency of vitamin D but no any significantly difference was observed in both groups. Deficient vitamin D serum levels were 15.01±1.22 in group I and 14.34±4.12 in group II. (table 2)

DISCUSSION

Many studies have related the prevalence and severity of COVID-19 to low vitamin D levels. COVID-19 has been related to vitamin D insufficiency, and the present controversy is centred upon that link." A number of interleukins are known to be overproduced in response to CoV-2 disease, among them TNF-, interleukin-8, interleukin-12, and most importantly interleukin-6 (IL-6). [IL-6]. [16] Cytokine production is sped up by highly activated immune cells, which infiltrate the lung cells and produce higher levels of inflammation. COVID-19, which causes significant tissue destruction, is associated to acute respiratory distress syndrome (ARDS). A cytokine storm, which happens when the host's immune system overreacts, is connected to the COVID's severity. [17,18]

In this observational/comparative study 120 pregnant women with coronavirus included. Enrolled patients were aged between 18-45years.Females were split into two groups. Group I had 60 vaccinated patients and in group II 60 non-vaccinated pregnant women. Mean age of the patients in group I was 28.4±8.55 years with mean BMI 24.08±1.18 kg/m^2 and in group II mean age was 27.41±6.37 years with mean BMI 23.12±4.42 kg/m^2. Mean gestational age in group I was 33.12±9.42 weeks and in group II mean gestational age was 34.07±5.63 weeks. Findings of current study was comparable to the studies conducted previously.[19,20] Mean parity in group I was 3.88±7.27 and in group II 4.01±4.14 was mean parity. We found that 28 (46.7%) primigravida women in group I and 30 (50%) primigravida patients in group II.[21]

In group I 51(85%) patients had vitamin D deficiency and in group II 54 (90%) had deficiency of vitamin D but no any significantly difference was observed in both groups. Deficient vitamin D serum levels were 15.01±1.22 in group I and 14.34±4.12 in group II.[19,22] Among 51 deficient women of group I, number of severe deficiency (<10ng/ml) women were 8 (13.3%), deficiency (10-20ng/ml) were 13 (21.7%) and not-sufficient (20-30ng/ml) were 30 (50%) and in group II prevalence of severity (<10ng/ml) patients were 10 (16.7%), deficient cases (10-20ng/ml) were 15 (25%) and not-sufficient cases (20-30ng/ml) were 29 (48.3%). Given the prevalence of vitamin D shortage in pregnant women, we don't believe it's unexpected that 25-OH vitamin D levels were low in healthy pregnant women. Researchers discovered a robust link between prenatal 25-OH D vitamin levels and COVID-19 severity, which is consistent with the findings of the great majority of relevant investigations.[23-25]

Vitamin D's immune-enhancing and anti-inflammatory properties may reduce the spread of COVID-19 in sensitive groups such as pregnant women [26]. Vitamin D deficiency and not pregnancy results can be prevented in pregnant women by effective vitamin D prophylaxis programmes, which are especially important during the winter months.

We found in this research that there is a link between coronavirus and vitamin D insufficiency, with vitamin D levels in pregnant women being low. The coronavirus vaccination may help pregnant women with vitamin D insufficiency. Vitamin D insufficiency was shown to be lower in vaccinated individuals than in non-vaccinated ones. Vitamin D insufficiency was more severe in non-vaccinated people, and it was directly related to COVID-19 severity.

CONCLUSION

We found that the frequency of vitamin D insufficiency was high among pregnant women and most likely among non-vaccinated pregnant patients in our research, but that there was no significant difference between the two groups.

REFERENCES

1 World Health Organization (WHO) (2020) Clinical management of COVID-19: interim guidance, 27 May 2020. World Health

Organization. https://apps.who.int/iris/handle/10665/332196. Accessed 25 Mar 2021
2 Cena H, Chieppa M (2020) Coronavirus disease (COVID-19–SARS-CoV-2) and nutrition: is infection in Italy suggesting a connection? Front Immunol 11:944.
3 Boulkrane MS, Ilina V, Melchakov R et al (2020) COVID-19 disease and vitamin D: a mini-review. Front Pharmacol 11:2107.
4 Ali N (2020) Role of vitamin D in preventing of COVID-19 infection, progression and severity. J Infect Public Health 13(10):1373–1380.
5 Angelidi AM, Belanger MJ, Lorinsky MK et al (2021) Vitamin D status is associated with in-hospital mortality and mechanical ventilation: a cohort of COVID-19 hospitalized patients. Mayo Clin Proc 96(4):875–886.
6 Smolders J, van den Ouweland J, Geven C, Pickkers P, Kox M (2021) Letter to the editor: Vitamin D deficiency in COVID-19: mixing up cause and consequence. Metabolism.
7 Pugach IZ, Pugach S (2021) Strong correlation between prevalence of severe vitamin D deficiency and population mortality rate from COVID-19 in Europe. Wien Klin Wochenschr.
8 Kazemi A, Mohammadi V, Aghababaee SK, Golzarand M, Clark CC, Babajafari S (2021) Association of vitamin D status with SARS-CoV-2 infection or COVID-19 severity: a systematic review and meta-analysis. Adv Nutr.
9 Meltzer DO, Best TJ, Zhang H, Vokes T, Arora V, Solway J (2020) Association of vitamin D status and other clinical characteristics with COVID-19 test results. JAMA Netw Open 3(9):e2019722. h
10 De Smet D, De Smet K, Herroelen P, Gryspeerdt S, Martens GA (2021) Serum 25(OH)D level on hospital admission associated with COVID-19 stage and mortality. Am J Clin Pathol 155(3):381–388.
11 Murdaca G, Tonacci A, Negrini S, et al. Emerging role of vitamin D in autoimmune diseases: an update on evidence and therapeutic implications. Autoimmun Rev. 2019;18(9):102350.
12 Zhang H, Huang Q, Zhang Z, et al. Vitamin D status of postmenopausal women in winter in Shanghai. Chin J Osteoporosis. 2011;17(1):43–46.
13 Merzon E, Tworowski D, Gorohovski A, et al. Low plasma 25(OH) vitamin D level is associated with increased risk of COVID-19 infection: an Israeli population-based study. FEBS J. 2020.
14 Mattioli AV, Sciomer S, Cocchi C, et al. Quarantine during COVID-19 outbreak: changes in diet and physical activity increase the risk of cardiovascular disease. Nutr Metab Cardiovasc Dis. 202
15 Halasa N, Williams J, Faouri S, et al. Natural history and epidemiology of respiratory syncytial virus infection in the Middle East: Hospital surveillance for children under age two in Jordan. Vaccine. 2015;33(47):6479–6487
16 D. Wang, B. Hu, C. Hu, F. Zhu, X. Liu, J. Zhang, B. Wang, H. Xiang, Z. Cheng, Y. Xiong, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China JAMA, 323 (11) (2020), pp. 1061-1069
17 Q. Ye, B. Wang, J. Mao The pathogenesis and treatment of the 'Cytokine Storm' in COVID-19J. Infect., 80 (6) (2020), pp. 607-613
18 P. Mehta, D.F. McAuley, M. Brown, E. Sanchez, R.S. Tattersall, J.J. Manson, HLH Across Speciality Collaboration, UKCOVID-19: consider cytokine storm syndromes and immunosuppression Lancet, 395 (10229) (2020), pp. 1033-1034
19 Selcan Sinaci, Doga Fatma Ocal, Didem Fatma Yucel Yetiskin, Derya Uyan Hendem, Gul Nihal Buyuk, Sule Goncu Ayhan, Atakan Tanacan, A. Seval Ozgu-Erdinc, Ozlem Moraloglu Tekin, Dilek Sahin. Impact of vitamin D on the course of COVID-19 during pregnancy: A case control study, The Journal of Steroid Biochemistry and Molecular Biology, Volume 213,2021,
20 Chillon, T.S.; Demircan, K.; Heller, R.A.; Hirschbil-Bremer, I.M.; Diegmann, J.; Bachmann, M.; Moghaddam, A.; Schomburg, L. Relationship between Vitamin D Status and Antibody Response to COVID-19 mRNA Vaccination in Healthy Adults. Biomedicines 2021, 9, 1714.
21 Tekin, A.B., Yassa, M., Birol, P. et al. Vitamin D status is not associated with clinical severity of COVID-19 in pregnant women. Eur J Nutr (2021).
22 A.T. Ergür, M. Berberoğlu, B. Atasay, et al.Vitamin D deficiency in Turkish mothers and their neonates and in women of reproductive age J Clin Res Pediatr Endocrinol, 1 (6) (2009), pp. 266-269,
23 N. Bokharee, Y.H. Khan, T. Wasim, T.H. Mallhi, N.H. Alotaibi, M.S. Iqbal, K. Rehman, A.I. Alzarea, A. Khokhar Daily versus stat vitamin D supplementation during pregnancy; a prospective cohort study PLoS One, 15 (April (4) (2020), Article e0231590
24 E.B. Jude, S.F. Ling, R. Allcock, B.X.Y. Yeap, J.M. Pappachan. Vitamin D deficiency is associated with higher hospitalisation risk from COVID-19: a retrospective case-control studyJ. Clin. Endocrinol. Metab. (June (17)) (2021),
25 F. Petrelli, A. Luciani, G. Perego, G. Dognini, P.L. Colombelli, A. Ghidini Therapeutic and prognostic role of vitamin D for COVID-19 infection: a systematic review and meta-analysis of 43 observational studiesJ. Steroid Biochem. Mol. Biol., 211 (March (26)) (2021),
26 P.C. Calder, A.C. Carr, A.F. Gombart, M. Eggersdorfer Optimal nutritional status for a well-functioning immune system is an important factor to protect against viral infections.Nutrients, 12 (2020), p. 1181