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ORIGINAL ARTICLE

Analysis of Vitamin D Levels in Vaccinated and Non Vaccinated Pregnant Women with Covid-19

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ABSTRACT

Objective: The purpose of this research is to examine the levels of vitamin D in pregnant women who have been vaccinated and those who have not been vaccinated.

Study Design: Comparative/Observational study

Place and Duration: CMH Bahawalpur.Jun-2019-Feb 2020

Methods: A total of 106 cases of coronavirus illness in pregnant women were reported. Permission to collect detailed demographic information such as age, gestational age, parity, and body mass index was obtained by written informed permission. Women were mostly between the ages of 18 and 42. Patients were grouped into two distinct categories. Group A included 53 people who had vaccinations, whereas group B included 53 women who had not received vaccinations. Serum 25-hydroxy vitaminD3 [25 (OH) D3] levels were measured in all individuals. The levels of vitamin D insufficiency in the two groups were compared. Vitamin D sufficiency was defined as a blood level of >30ng/ml. The full dataset was analyzed by using SPSS 24.0.

Results: In group number of primigravida was 24 (45.2%) and in group II 26 (49.1%) cases were. Frequency of vitamin D deficiency was lower in group I 44 (83.01%) patients as compared to group II in 50 (94.3%) cases. In group I, severe deficiency (<10ng/ml) was found in 10 (18.9%), deficiency (10-20ng/ml) were found in 14 (26.4%) and not-sufficient (20-30ng/ml) were in 20 (37.7%) while in group II severe deficiency (<10ng/ml) was found in 15(28.3%), frequency of deficient patients (10-20ng/ml) was 17 (32.1%) and not-sufficient cases (20-30ng/ml) were 18 (33.9%). In group I deficient vitamin D serum levels was 16.03±2.42 and in group II was 13.14±8.41.

Conclusion: According to the findings of this research, vitamin D insufficiency is more common in pregnant women who have not been vaccinated and is more likely to occur in these women, as well as in non-vaccinated patients who do not have low blood levels.

Keywords: Vaccination Pregnancy, Vitamin D, COVID-19

INTRODUCTION

SARS-CoV-2 was first discovered in Wuhan, China, and it quickly spread over the globe. The World Health Organization (WHO) declared a global health emergency on 31 January 2020, and a pandemic on 11 March 2020. As of this writing, there are more than 400 million verified instances of this coronavirus, including approximately 6 million fatalities globally. Pregnancy-related SARS-CoV-2 infection symptoms are comparable to those seen in the general population. In contrast, when pregnant women exhibit clinical symptoms, they're more likely to be admitted to the intensive care unit (ICU) than non-pregnant women [2]. Some writers believe that this is because of the physiological changes that occur during pregnancy, which may raise the likelihood of problems [3–5].

Vitamin D supplementation has been related to an increased risk of SARS-CoV-2 infection, even if a relationship between deficiency and severity or death has not been confirmed in 62 data sets from 20 European countries. The SARS-CoV-2 pandemic has been shown to be favourable to the non-pregnant population that eats enough vitamin D [5, 7]. Even in the most severe and fatal cases of COVID-19, vitamin D deficiency may play a role. [10]

Vitamin D, a fat-soluble steroid prohormone vitamin, is necessary for good health. Vitamin D, which regulates calcium and phosphorus metabolism, is necessary for bone health and growth. Insufficient or inadequate levels of vitamin D have been related to a broad variety of illnesses and disorders, including heart disease and breast cancer. [11] Levels beyond 20ng/mL are considered poor, whereas levels between 21 and 29ng/mL are considered insufficient and values between 30 and 100ng/mL are considered normal. Vitamin D deficiency or insufficiency affects people of all ages, regardless of their age or gender. Menopausal women in Shanghai are at risk of Vitamin D deficiency or lack throughout the winter. Vitamin D insufficiency or inadequacy affects 88 percent of Beijing men. During the winter months, 86.6 percent of the population in the Southeast United States is made up of expectant mothers.... Compared to COVID-19 negative patients, COVID-19 positive patients showed considerably higher mean plasma 25(OH)D concentrations. In quarantine, vitamin D absorption from food and sunlight would be decreased. Studies show that those with low levels of 25(OH)D have a greater risk of infection and hospitalisation. Vitamin D deficiency has been related to greater rates of illness and death across Europe and Asia, according to data from Worldometers (infection and mortality statistics, as of December 31, 2020). Low levels of 25(OH)D have been linked to an increased risk of COVID-19 infection in the elderly, pregnant women, and those with chronic renal failure. The prevalence of 25(OH)D insufficiency in COVID-19 patients is two times more than the general population [10-14].

Preeclampsia, preeclampsia, foetal growth limitation, gestational diabetes, neonatal respiratory illness, autoimmune diseases, and autism spectrum disorder have all been associated to low vitamin D levels. Pregnancy increases a woman's risk of getting COVID-19, however the evidence for a relationship between vitamin D and COVID-19 is minimal. [15]

In light of the current state of the coronavirus epidemic in 2019 (COVID-19), pregnant women's safety and the health of their unborn children have become top priorities in the fight against the illness. But the impact of vitamin D levels in pregnant women's COVID-19 has not been well studied. So our goal was to investigate the link between 25(OH)D levels in pregnant women with COVID-19 infection and the severity of the illness.

MATERIAL AND METHODS

This observational comparative study was conducted at CMH Bahawalpur and comprised of 106 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.

Patients included in the study ranged in age from 18 to 42. Patients were divided into two distinct groups for the purposes of this study. Group A included 53 people who had vaccinations, whereas group B included 53 women who had not received vaccinations. The amount of serum 25-hydroxy vitaminD3 (also written as 25 (OH) D3) was measured using blood samples collected from all of the patients. The concentrations of serum 25-hydroxyvitamin D (25(OH)) were used in order to ascertain vitamin D status. In order to assess 25-VitD, we made use of an automated chemiluminescent immunoassay using a kit that was provided by ids Holdings PLC. A value between 20-30 ng/mL within the assay's measurement range was considered to be indicative of vitamin D deficiency Those individuals who had values between >30ng/mL were regarded to have sufficient amounts of vitamin D. Tests for vitamin D insufficiency caused by dietary supplements were carried out, and results with a ng/ml value of less than 10 indicated a severe lack of the vitamin. We utilized the mean and standard deviation to analyze the data, and we evaluated the categorical variables based on frequency and percentage. The full dataset was analyzed by using SPSS 24.0.

RESULTS

Mean age of the patients in group I was 30.6±8.21 years and had mean BMI 24.7±5.61 kg/m^2 while in group II age of the females was 29.13±8.31 years and had mean BMI 24.2±6.52 kg/m^2. In group I mean gestational age was 35.14±4.32 weeks and mean gestational age in group II was 34.14±7.71 weeks. In group I mean parity was 4.01±4.10 while in group II mean parity was 3.31±7.31.(table 1)

Table-1: Characteristics of enrolled pregnant women

Variables	Vaccinated	Non-vaccinated
Mean age (years)	30.6±8.21	29.13±8.31
Mean BMI (kg/m^2)	24.7±5.61	24.2±6.52
Mean gestational age (weeks)	35.14±4.32	34.14±7.71
Mean parity	4.01±4.10	3.31±7.31

In group I number of primigravida was 24 (45.2%) and in group II 26 (49.1%) cases were primigravida.(fig 1)

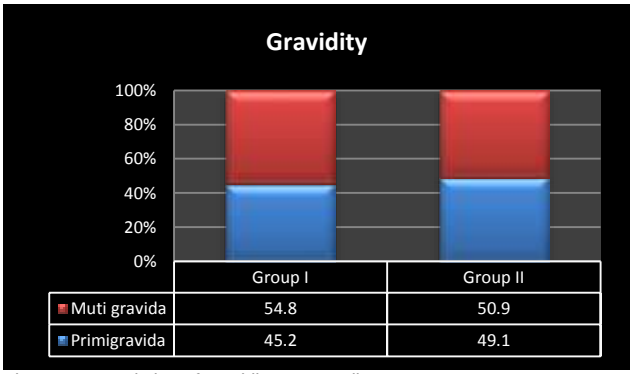

Figure-1: Association of gravidity among all cases

Frequency of vitamin D deficiency was lower in group I 44 (83.01%) patients as compared to group II in 50 (94.3%) cases. In group I deficient vitamin D serum levels was 16.03±2.42 and in group II was 13.14±8.41. (table 2)

Table 2: Vitamin D insufficiency in both groups was compared

Variables	Group I (60)	Group II (60)
Vitamin D deficiency		
Yes	44 (83.01%)	50 (94.3%)
No	9 (16.9%)	3 (5.7%)
Mean Serum Level	16.03±2.42	13.14±8.41

In group I, severe deficiency (<10ng/ml) was found in 10 (18.9%), deficiency (10-20ng/ml) were found in 14 (26.4%) and not-sufficient (20-30ng/ml) were in 20 (37.7%) while in group II severe deficiency (<10ng/ml) was found in 15(28.3%), frequency of deficient patients (10-20ng/ml) was 17 (32.1%) and not-sufficient cases (20-30ng/ml) were 18 (33.9%). (table 3)

Table 3: Association of vitamin D levels among both groups

Variables	Group I (44)	Group II (50)
Levels of Vitamin D deficiency		
severely deficient (<10ng/ml)	10 (18.9%)	15(28.3%),
deficient (10-20ng/ml)	14 (26.4%)	17 (32.1%)
insufficient (20-30ng/ml)	20 (37.7%)	18 (33.9%)
Total	44 (83.01%)	50 (94.3%)

DISCUSSION

Vitamin D deficiency has been linked to an increased risk of COVID-19. The current debate concerning COVID-19 is around its relation to vitamin D deficiency. TNF, interleukin-8, interleukin-12, and most critically interleukin-6 are among the interleukins known to be overproduced in response to CoV-2 illness (IL-6). [IL-6]. [16] Activated immune cells penetrate lung cells and generate more cytokines, resulting in an increase in inflammation. As a result of COVID-19's extensive tissue degradation, acute respiratory distress syndrome is linked to it (ARDS). Symptoms of a COVID may be exacerbated by an immune system response known as a cytokine storm. [17,18]

106 pregnant women with coronavirus were enrolled in this observational/comparative research. Patients included in the study ranged in age from 18 to 42 years old. Patients were grouped into two distinct categories. Group A included 53 people who had vaccinations, whereas group B included 53 women who had not received vaccinations. Mean age of the patients in group I was 30.6±8.21 years and had mean BMI 24.7±5.61 kg/m^2 while in group II age of the females was 29.13±8.31 years and had mean BMI 24.2±6.52 kg/m^2. In group I mean gestational age was 35.14±4.32 weeks and mean gestational age in group II was 34.14±7.71 weeks. In group I mean parity was 4.01±4.10 while in group II mean parity was 3.31±7.31. Findings of current study was comparable to the studies conducted previously.[19,20]. In group I number of primigravida was 24 (45.2%) and in group II 26 (49.1%) cases were primigravida.[21]

Frequency of vitamin D deficiency was lower in group I 44 (83.01%) patients as compared to group II in 50 (94.3%) cases. In group I deficient vitamin D serum levels was 16.03±2.42 and in group II was 13.14±8.41 [19,22] In group I, severe deficiency (<10ng/ml) was found in 10 (18.9%), deficiency (10-20ng/ml) were found in 14 (26.4%) and not-sufficient (20-30ng/ml) were in 20 (37.7%) while in group II severe deficiency (<10ng/ml) was found in 15(28.3%), frequency of deficient patients (10-20ng/ml) was 17 (32.1%) and not-sufficient cases (20-30ng/ml) were 18 (33.9%). We don't think it's surprising that 25-OH vitamin D levels were low in healthy pregnant women given the frequency of vitamin D deficiency in pregnant women. Several studies have shown a strong connection between prenatal 25-OH D vitamin levels and the severity of COVID-19, and this latest discovery is no exception. [23-25]

COVID-19 may be less likely to spread in pregnant women because of vitamin D's immune-enhancing and anti-inflammatory characteristics. Effective vitamin D prophylaxis programmes, which are particularly crucial in the winter months, may help pregnant women avoid vitamin D shortage and, as a consequence, avoid negative pregnancy outcomes.[26,27]

According to our findings, vitamin D deficiency is associated with coronavirus infection and low levels of vitamin D in pregnant women. Pregnant women who are deficient in vitamin D may benefit from coronavirus vaccine. Vitamin D deficiency was shown to be lower in those who had been vaccinated compared to those

who hadn't. Non-vaccinated persons were more likely to suffer from vitamin D deficiency, which was directly linked to the severity of COVID-19.

CONCLUSION

According to the findings of this research, vitamin D insufficiency is more common in pregnant women who have not been vaccinated and is more likely to occur in these women, as well as in non-vaccinated patients who do not have low blood levels.

REFERENCES

1 World Health Organization (WHO). Coronavirus (COVID-19). 2021. Available online: https://who.sprinklr.com/ (accessed on 10 February 2022).

2 Madjunkov, M.; Dviri, M.; Librach, C. A comprehensive review of the impact of COVID-19 on human reproductive biology, assisted reproduction care and pregnancy: A Canadian perspective. J. Ovarian Res. 2020, 13, 140.

3 Wastnedge, E.A.N.; Reynolds, R.M.; Van Boeckel, S.R.; Stock, S.J.; Denison, F.C.; Maybin, J.A.; Critchley, H.O.D. Pregnancy and COVID-19. Physiol. Rev. 2020, 101, 303–318.

4 Di Mascio, D.; Khalil, A.; Saccone, G.; Rizzo, G.; Buca, D.; Liberati, M.; Vecchiet, J.; Nappi, L.; Scambia, G.; Berghella, V.; et al. Outcome of Coronavirus spectrum infections (SARS, MERS, COVID 1-19) during pregnancy: A systematic review and meta-analysis. AJOG MFM 2020, 2, 100107.

5 Narang, K.; Enninga, E.A.L.; Gunaratne, M.D.; Ibirogba, E.R.; Trad, A.T.A.; Elrefaei, A.; Theiler, R.N.; Ruano, R.; Szymanski, L.M.; Chakraborty, R.; et al. SARS-CoV-2 infection and COVID-19 during pregnancy: A multidisciplinary review. Mayo Clin. Proc. 2020, 95, 1750–1765.

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 Sinaci S, Ocal DF, Yucel Yetiskin DF, Uyan Hendem D, Buyuk GN, Goncu Ayhan S, Tanacan A, Ozgu-Erdinc AS, Moraloglu Tekin O, Sahin D. Impact of vitamin D on the course of COVID-19 during pregnancy: A case control study. J Steroid Biochem Mol Biol. 2021 Oct;213:105964.

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 immunosuppressionLancet, 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. KhokharDaily 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.V itamin 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 Vassiliou, A.G.; Jahaj, E.; Pratikaki, M.; Keskinidou, C.; Detsika, M.; Grigoriou, E.; Psarra, K.; Orfanos, S.E.; Tsirogianni, A.; Dimopoulou, I.; et al. Vitamin D deficiency correlates with a reduced number of natural killer cells in intensive care unit (ICU) and non-ICU patients with COVID-19 pneumonia. Hell. J. Cardiol. C 2021, 62, 381–383

27 Bahat, P.Y.; Talma, M.A.; Bestel, A.; Selcuki, N.F.T.; Aydın, Z.; Polat, ˙I. Micronutrients in COVID-19 Positive Pregnancies. Cureus 2020, 12, e10609

28 Luo, X.; Liao, Q.; Shen, Y.; Li, H.; Cheng, L. Vitamin D deficiency is inversely associated with COVID-19 incidence and disease severity in Chinese people. J. Nutr. 2021, 151, 98–103.