

CORRESPONDENCE

CORONA EXPERIENCE

Does vitamin D supplementation for COVID-19 increase the chances of fertility in women with polycystic ovary syndrome?

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Summary: COVID-19 has been associated with factors such as inflammation, obesity, low vitamin D levels, and hyperandrogenism. These factors are also directly related to Polycystic ovary syndrome (PCOS). We hypothesize that concurrent COVID-19 and high dose vitamin D supplement will decrease the inflammation, and can increase the chances of fertility in these women.

Key words: Polycystic ovary syndrome; COVID-19; SARS-CoV-2; Vitamin D; Inflammation; Infertility

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Vitamin D, as a fat-soluble vitamin, is involved in regulating inflammatory processes and reducing inflammation, besides its main role to increase the absorption of calcium and phosphorus. Recently a major non-calcitropic function of vitamin D in the regulation of the immune system has been stressed.¹ Studies have shown that vitamin D can reduce the progression of chronic disease by inhibiting the destructive factors of pancreatic beta cells, reducing insulin sensitivity, systemic inflammation, and reducing adipokine (as an inflammation-regulating adipokine).^{2,3} According to the results of studies, vitamin D supplementation, by increasing the level of adiponectin and subsequent secretion of insulin in response to glucose consumption, can reduce the progression of complications of diabetes and cardiovascular disease by affecting the level of adipokines.³ Therefore, it seems that the application of this micronutrient is well beyond merely regulating the calcium and phosphorus metabolism. About 3% of the human genome is directly or indirectly controlled by 1, 25-Dihydroxyvitamin D (1, 25(OH) 2 D). In a study the significant effect of different variants of vitamin D receptor gene on the phenotype of Polycystic Ovary Syndrome (PCOS) was confirmed.⁴

PCOS is defined by increased levels of androgens, abnormal ovulation, irregular menstrual cycles, and polycystic ovarian morphology in one or both ovaries.⁵ Vitamin D deficiency is common in women with and without PCOS, and it may be associated with metabolic and endocrine disorders in PCOS.⁶ Women with PCOS are potentially at risk for cardiovascular disease due to known risk factors, including insulin resistance, obesity, and type 2 diabetes.⁷ PCOS is associated with the development of certain antibodies in the body, including anti-ovarian antibodies, anti-pancreatic antibodies, and autoimmune diseases.⁸

The new beta-coronavirus, known as severe acute respiratory syndrome corona virus 2 (SARS-CoV-2), is known to cause COVID-19. The virus causes multiple organ failure, severe pneumonia, and acute lung failure.⁹ However, no effective treatment has been agreed upon to control and reduce the disease. But an immune response is essential to control and eradicate COVID-19. An inadequate immune system response and impaired pulmonary gas exchange will cause more inflammation and enhance severity of symptoms in the susceptible patients.¹⁰ Severe COVID-19 is associated with factors such as inflammation, obesity, low vitamin D levels, and hyper androgenism. These factors are also directly related to the incidence of PCOS.¹¹ Therefore,

it is assumed that these factors make women with PCOS susceptible to COVID-19.¹²

The incidence of COVID-19 is associated with serum vitamin D levels. Low serum vitamin D levels can increase the incidence and mortality of COVID-19. Vitamin D3 supplementation can reduce the risk of COVID-19.¹³ In women with PCOS, vitamin D levels are negatively correlated with serum androgen levels. Vitamin D treatment can reduce serum androgen levels, antimüllerian hormone (AMH) and endometrial thickness. Therefore, vitamin D improves the menstrual cycle and folliculogenesis in PCOS patients.¹⁴ COVID-19 and PCOS are directly linked to inflammation in the body.¹¹ The hypothesis is that concurrency of COVID-19 and vitamin D supplementation increase the chances of fertility in women with PCOS.

The patient was a 30-year-old woman with a menarche age of 14 y, 15 y history of PCOS, body mass index (BMI) 28.9 kg/m², waist circumference 98 cm, hip circumference 109 cm and married for 10 years. For the past 2 years, she had used 50,000 units of vitamin D3 per month to improve ovarian function. During the 3 weeks of COVID-19, she used 50,000 units of vitamin D3 per week, and 3 months after COVID-19, she resumed the use of 50,000 units of vitamin D3 per month and became pregnant for the first time. The use of vitamin D supplements had a positive effect on improving PCOS and COVID-19 by affecting anti-inflammatory processes and improving the immune system as well as fertility.

Conscious Satisfaction / ethical Approval: The confidentiality of the participant has been ensured and the informed consent to participate in the research was taken.

Competing Interest: There was no conflict of interest in this study.

Authors' contribution: All authors took equal part in the conduct of the study, literature search, manuscript preparation and final approval.

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