



# Coronavirus Vaccine and Pregnancy: An Overview of Potential Influences and Implications for Vaccinated Women

**Wafaa Ahmed Ameen<sup>1</sup>**

<sup>1</sup> PhD in Maternal and Neonate Nursing, College of Nursing, University of Babylon/Iraq [nur.wafaa.ahmed@uobabylon.edu.iq](mailto:nur.wafaa.ahmed@uobabylon.edu.iq)

**Wafaqq Mahdi Hadi<sup>2</sup>**

<sup>2</sup> MSc in Adult Nursing, College of Nursing, University of Babylon/Iraq [nur.wafaqq.mahdi@uobabylon.edu.iq](mailto:nur.wafaqq.mahdi@uobabylon.edu.iq)

**Maryam Abd Al-Kareem<sup>3</sup>**

<sup>3</sup> MSc in Maternal and Neonate Nursing, College of Nursing, University of Babylon/Iraq [nur.maryam.karim@uobabylon.edu.iq](mailto:nur.maryam.karim@uobabylon.edu.iq)

**Ahmed Sh. Alzuheri<sup>4</sup>**

<sup>4</sup> PhD in Family and Community Nursing, Higher Health Institute of Babylon/ Iraq [ahmed.zuhiri@atu.edu.iq](mailto:ahmed.zuhiri@atu.edu.iq)

**Hayder M. Obaid<sup>5</sup>**

<sup>5</sup> PhD in Adult Nursing, Higher Health Institute of Babylon/ Iraq [hayder.obaid@atu.edu.iq](mailto:hayder.obaid@atu.edu.iq)

## ABSTRACT

Coronavirus disease (COVID-19) is a developing coronavirus infection (SARS-CoV-2). The majority of patients who contract COVID-19 experience mild to moderate symptoms and recover without requiring specific treatment. However, some of them will get gravely ill and require medical care. The virus can be spread from an infected person's mouth or nose by minute particles transmitted during coughing, sneezing, speaking, and breathing, or by touching a contaminated surface and then touching the eyes, nose, or mouth. Coronavirus disease 2019 (COVID-19) vaccines have begun to be distributed throughout the world, following the completion of all scientific stages of manufacture and the completion of clinical examinations of the volunteers who participated in those tests. The vaccines will be offered first to priority groups such as healthcare workers, people living in long-term care facilities, and other target groups. Several studies have proven that the various coronavirus vaccines have no adverse effect on women's fertility or capacity to conceive, and that there is no detrimental effect on pregnant women from the immunizations.

### Keywords:

Coronavirus Vaccine, Pregnancy, Influences, Implications Vaccinated Women

## Introduction

The Covid-19 pandemic was initially detected in Wuhan, China's capital of Hubei Province, when infections began in December 2019 and spread to all countries of the world over the course of a few months [1]. Corona became a worldwide pandemic, impacting individuals from all walks of life. It began in China and spread throughout the world. Following then, many people have died as a result of being infected with this virus [2]. The

World Health Organization (WHO) announced a state of emergency in March 2020, citing COVID-19 as a global pandemic [3]. Contacting surfaces or things contaminated by the virus and then touching one's lips, nose, or eyes can spread the sickness quickly. People who have symptoms can spread the illness to others, especially close friends and family [4]. The number of Corona Virus Disease (COVID-19) cases is increasing every day, with a mortality rate of 4.63 percent; however, the mortality rate varies by country.

According to WHO data from March 29, 2020, it has infected over 658,347 people in 201 countries, with an overall mortality rate of 30,460 people [5]. The COVID-19 outbreak in Iraq has impacted negatively on the country's already-fragile health system. On February 21, 2020, Iraq reported its first case of COVID-19 [6]. Iraqi health authorities implemented a lockdown involving some public sectors in an attempt to slow the rapid spread of the pandemic, which was met with mixed success [7]. Before the middle of September 2020, more than 200,000 Americans will have perished as a result of the disease in the United States. The risk of COVID-19-related morbidity and mortality increases with increasing age, according to the CDC [8].

At first, it was difficult to produce a vaccine against the Coronavirus, which was a difficult task due to the virus's mutation and stability. Using methods such as structure-based antigen design, computational biology, protein engineering, and gene synthesis, vaccines may be manufactured precisely and quickly [9]. Since COVID-19 vaccinations have only recently become available, it is too early to say how long a person will be protected from COVID-19 after immunization. This question is currently being researched. Even though the existing data demonstrate that most COVID-19 survivors generated an immune response that provided protection against reinfection for at least some time, more research is needed to determine the efficacy, duration, and protective levels of SARS-CoV-2 IgG antibodies [10]. The first COVID-19 vaccines were sent to Iraq around the end of March 2021. According to the national vaccine deployment plan and framework, the Ministry of Health provided vaccines to health facilities across the country to be used in protecting persons from priority groups [11]. Following the approval of the Corona virus vaccine, requests for the vaccination of health-care providers at health-care facilities began to be heard. This is a critical step in avoiding the spread of the virus in the health-care setting and is highly recommended [12]. Additionally, persons who are most

sensitive to the disease, such as the elderly are targeted [13]. In addition, being pregnant, trying to get pregnant, or breastfeeding have not been ruled out as contraindications to receiving the immunizations [14].

### **Influences and Implications of Coronavirus Vaccine on the Women Fertility**

Fertility is defined as the ability of a woman to become pregnant after having sex with someone for at least one year, or for at least six months if the woman is above 35 years old; during this time, the body is prepared for conception. For decades, researchers have been investigating the relationship between viral infection and fertility [15]. A variety of viruses, including the Zika virus, HIV, and CMV, have been found in human sperm, some of which are known to have an impact on male reproductive potential [16]. A detailed investigation into the effects of coronavirus disease 2019 (COVID-19) on the human reproductive system is, without a question, an important requirement for the future. Some individuals believe that because of the potential harm that COVID-19 may do to the reproductive system, the vaccine that mimics the virus (mRNA vaccine) may also have an effect on fertility through the same method as the virus itself [17].

In the current state of knowledge, there is very little evidence of the influence of the COVID-19 mRNA vaccination on human fertility. For the time being, however, two investigations have demonstrated that both BNT162b2 and mRNA-1273 immunization have no effect on sperm parameters, including concentration, semen volume, sperm motility, sperm volume, and the total number of motile sperm [18] [19]. Similarly, when comparing vaccinated and uninfected women, an examination of follicular steroidogenesis and oocyte quality revealed no discernible differences [20]. Furthermore, the findings of the study revealed that many IVF treatment parameters, such as the number of oocytes and mature oocytes retrieved, the fertilization rate, and the ratio of top-quality embryos (TQEs) per fertilized oocyte, did not differ significantly between the pre- and post-BNT162b2 vaccination groups when comparing

the two groups [21]. Overall, the primary findings of various research in this area all point to the fact that immunization has no discernible negative impact on the female or male reproductive systems [17].

### **Influences and Implications of Coronavirus Vaccine on the Pregnancy and Fetus**

The US Food and Drug Administration (FDA) issued an Emergency Use Authorization (EUA) in December 2020 for the following two COVID-19 vaccines: (the Pfizer BioNtech vaccine for persons aged 16 years) and (the Moderna vaccine for persons aged 18 years) [14]. The Centers for Disease Control and Prevention determined which groups of people could benefit from the vaccine, including pregnant women. According to the CDC, "if pregnant people are part of a group that is recommended to receive a COVID-19 vaccine (e.g., healthcare personnel), they may choose to be vaccinated [22].

Despite the substantial threat posed by COVID-19 to pregnant women, doubts about the safety and efficacy of mRNA vaccines have prevented the majority of pregnant women from receiving their immunizations. As previously stated, the SARS-CoV-2 S protein is thought to be structurally identical to the human syncytin-1 protein (syncytin). However, the similarities are extremely limited, as only two identical two-aminoacid segments were discovered when the search was restricted to tiny regions of similarity [23]. After analyzing serum from women who had received COVID-19, researchers found no evidence of syncytin-1 protein cross-reactivity with the patients [24] and, most importantly, several recent studies have found no difference in implantation or sustained implantation rates (transvaginal ultrasound-documented positive fetal heart tones at two time points at least one week apart) between the general population and women who had previously received COVID-19 [25].

When compared to mothers who were infected with COVID-19, the results of the study showed that those who were vaccinated had a significantly lower risk of premature rupture of

membranes (0.8 % versus 8.3 %), stillbirth (0.1 % versus 1.0 %), and preterm delivery (7.3 % versus 21.4 %). It was revealed that there were no differences between the vaccinated and unvaccinated groups in terms of neonatal issues (such as newborn respiratory complications), but it was discovered that the COVID-19 patients had an abnormal miscarriage rate (4.1 %) [26]. The safety and effectiveness of COVID-19 vaccinations in pregnant women have not been questioned. Comparing vaccinated pregnant women to unvaccinated pregnant controls, the incidence of reported corona infection began to decline drastically after 14 days in the vaccinated pregnant women group [27]. Additionally, maternal antibodies, whether developed as a result of infection or vaccination, have the potential to protect babies against infection and lessen the reluctance of pregnant women to be vaccinated. It has been established in previous studies that the transmission of COVID-19 to the fetus is greatly reduced in people who are infected during the third trimester [28]. The good news is that this impairment is not detected in infections occurring during the second trimester. Individuals who had recovered from COVID-19 many months earlier showed significant levels of maternal and cord blood S-specific Abs, as well as a high transfer ratio at the time of delivery [29]. This mechanism of transfer across the placenta can be utilized to explain the differences in transfer ratios observed in pregnant women who got the COVID-19 vaccinations in several investigations, including the current one [30]. According to the findings, a larger transfer ratio was associated with a longer interval between the start of maternal vaccination and the time of birth. With regard to vaccination, given that maternal IgG can pass the placenta barrier and reach levels comparable to those of mother in the fetus within 15 days after the first dose of vaccine [29].

Because the transfer through the placenta begins in the 17th to 18th week of pregnancy and reaches its peak as the pregnancy progresses, maternal vaccination

beginning in the early second trimester of pregnancy may be the most effective strategy for ensuring that newborns acquire innate immunity against corona infection. In order to provide the maximum possible protection for both the mother and her newborn, it is ideal to vaccinate during the vital window of time [30]. It is also prudent to state that pregnant women in their third trimester should also receive the COVID-19 vaccine, particularly those who live in high transmission areas and those who work as frontline health workers, given that protection from breast milk is less effective than protection from trans-placental in infants [31].

### Conclusion

Coronavirus disease (COVID-19) is an infectious disease caused by the newly discovered coronavirus COVID-19 (SARS-CoV-2). The majority of patients who contract COVID-19 experience mild to moderate symptoms and recover without the need for specific treatment. Others will, on the other hand, become extremely unwell and will require medical attention. When an infected person coughs, sneezes, talks, or breathes, the virus can be spread through minute liquid particles from the mouth or nose of the infected person to others. Pregnant women, like the rest of the population, are at a higher risk of developing a serious illness from COVID-19. As a result, the Centers for Disease Control and Prevention (CDC) and the two largest obstetrics and gynecology organizations—the College of Obstetricians and Gynecologists and the Society for Maternal and Fetal Medicine—have recommended that the coronavirus vaccines be considered safe and effective, as demonstrated by studies in this regard. There were no problems with fertility or childbirth after women got the vaccine, and these studies also didn't find any.

### References

1. Abd Al-Kareem M, Abed MT, Mohammed H. Effect of COVID-19 Pandemic upon People's Life Aspects: An Overview Study. *Journal of University of Babylon for Pure and Applied Sciences*. 2021 Aug 1;29(2):225-33.
2. Javaid S, Javaid MK. Survey on corona virus: a case study in Pakistan. *International Journal of Medical Science in Clinical Research and Review*. 2020 Apr 17;3(02):223-7.
3. Abd Al Karim M, Hadi WM, Abed MT, Ameen WA, Obaid HM. Indications and Common Complications of Caesarean Section: An Overview Study. *Eurasian Medical Research Periodical*. 2021 Dec 30;3:40-4.
4. Ramesh N, Siddaiah A, Joseph B. Tackling corona virus disease 2019 (COVID 19) in workplaces. *Indian journal of occupational and environmental medicine*. 2020 Jan;24(1):16.
5. Sajed AN, Amgain K. Corona virus disease (COVID-19) outbreak and the strategy for prevention. *Europasian Journal of Medical Sciences*. 2020 Mar 29;2(1):1-3.
6. Lami F, Rashak HA, Khaleel HA, Mahdi SG, Adnan F, Khader YS, Alhilfi RA, Lehlewa A. Iraq experience in handling the COVID-19 pandemic: implications of public health challenges and lessons learned for future epidemic preparedness planning. *Journal of Public Health*. 2021 Dec;43(Supplement\_3):iii19-28.
7. Abed AH, Abdulwahid DA, Jassim HA. National Health Systems Response to COVID-19 Outbreak, Iraq an Example. *The Medical Journal of Basrah University*. 2021 Jun 1;39(1):1-6.
8. Bryan MS, Sun J, Jagai J, Horton DE, Montgomery A, Sargis R, Argos M. Coronavirus disease 2019 (COVID-19) mortality and neighborhood characteristics in Chicago. *Annals of epidemiology*. 2021 Apr 1;56:47-54.
9. Khan MS, Asif MI, Altaf R, Naem A, Ullah H. Coronavirus (COVID-19): A Systematic Review of Transmission, Diagnosis, and Vaccination. *Bull. Env. Pharmacol. Life Sci*. 2020 May 6;9:80-4.



10. Tutak AS, Söylemez F, Konuk HB, Çakmak E, Karakaya B, Doğan A, Sayiner HS, Aksöz S, Alev M. A patient presenting with ARDS after COVID-19 vaccination: A COVID-19 case report. *Journal of Infection and Public Health*. 2021 Oct 1;14(10):1395-7.
11. Al-Qerem W, Hammad A, Alsajri AH, Al-Hishma SW, Ling J, Mosleh R. COVID-19 Vaccination Acceptance and Its Associated Factors Among the Iraqi Population: A Cross Sectional Study. Patient preference and adherence. 2022;16:307.
12. Gilboa M, Tal I, Levin EG, Segal S, Belkin A, Zilberman-Daniels T, Biber A, Rubin C, Rahav G, Regev-Yochay G. Coronavirus disease 2019 (COVID-19) vaccination uptake among healthcare workers. *Infection Control & Hospital Epidemiology*. 2021 Sep 23:1-6.
13. Thomas K. New Pfizer results: Coronavirus vaccine is safe and 95% effective. *The New York Times*. 2020 Nov;18.
14. Centers for Disease Control and Prevention. Interim clinical considerations for use of COVID-19 vaccines currently authorized in the United States. CDC: Atlanta, GA, USA. 2021.
15. Hays JJ, Guzzo KB. Does sibling composition in childhood contribute to adult fertility behaviors?. *Journal of Marriage and Family*. 2022 Feb;84(1):53-79.
16. Counotte MJ, Kim CR, Wang J, Bernstein K, Deal CD, Broutet NJ, Low N. Sexual transmission of Zika virus and other flaviviruses: A living systematic review. *PLoS medicine*. 2018 Jul 24;15(7):e1002611.
17. Chen F, Zhu S, Dai Z, Hao L, Luan C, Guo Q, Meng C, Zhang Y. Effects of COVID-19 and mRNA vaccines on human fertility. *Human Reproduction*. 2022 Jan;37(1):5-13.
18. Gonzalez DC, Nassau DE, Khodamoradi K, Ibrahim E, Blachman-Braun R, Ory J, Ramasamy R. Sperm parameters before and after COVID-19 mRNA vaccination. *JAMA*. 2021 Jul 20;326(3):273-4.
19. Safrai M, Herzberg S, Imbar T, Reubinoff B, Dior U, Ben-Meir A. The BNT162b2 mRNA Covid-19 vaccine does not impair sperm parameters. *Reproductive BioMedicine Online*. 2022 Jan 31.
20. Bentov Y, Beharier O, Moav-Zafir A, Kabessa M, Godin M, Greenfield CS, Ketzinel-Gilad M, Ash Broder E, Holzer HE, Wolf D, Oiknine-Djian E. Ovarian follicular function is not altered by SARS-CoV-2 infection or BNT162b2 mRNA COVID-19 vaccination. *Human Reproduction*. 2021 Sep;36(9):2506-13.
21. Orvieto R, Noach-Hirsh M, Segev-Zahav A, Haas J, Nahum R, Aizer A. Does mRNA SARS-CoV-2 vaccine influence patients' performance during IVF-ET cycle?. *Reproductive Biology and Endocrinology*. 2021 Dec;19(1):1-4.
22. Chervenak FA, McCullough LB, Bornstein E, Johnson L, Katz A, McLeod-Sordjan R, Nimaroff M, Rochelson BL, Tekbali A, Warman A, Williams K. Professionally responsible coronavirus disease 2019 vaccination counseling of obstetrical and gynecologic patients. *American Journal of Obstetrics and Gynecology*. 2021 May 1;224(5):470-8.
23. Kloc M, Uosef A, Kubiak JZ, Ghobrial RM. Exaptation of retroviral syncytin for development of syncytialized placenta, its limited homology to the SARS-CoV-2 spike protein and arguments against disturbing narrative in the context of COVID-19 vaccination. *Biology*. 2021 Mar;10(3):238.
24. Lu-Culligan A, Iwasaki A. The false rumors about vaccines that are scaring women. *New York Times*. 2021 Jan 26;26.
25. Aharon D, Canon CM, Hanley WJ, Lee JA, Lederman MA, Stein DE, Copperman AB. mRNA covid-19 vaccines do not

- 
- compromise implantation of euploid embryos. *Fertility and Sterility*. 2021 Sep 1;116(3):e77.
26. Wainstock T, Yoles I, Sergienko R, Sheiner E. Prenatal maternal COVID-19 vaccination and pregnancy outcomes. *Vaccine*. 2021 Oct 1;39(41):6037-40.
27. Dagan N, Barda N, Biron-Shental T, Makov-Assif M, Key C, Kohane IS, Hernán MA, Lipsitch M, Hernandez-Diaz S, Reis BY, Balicer RD. Effectiveness of the BNT162b2 mRNA COVID-19 vaccine in pregnancy. *Nature medicine*. 2021 Oct;27(10):1693-5.
28. Atyeo C, Pullen KM, Bordt EA, Fischinger S, Burke J, Michell A, Slein MD, Loos C, Shook LL, Boatman AA, Yockey LJ. Compromised SARS-CoV-2-specific placental antibody transfer. *Cell*. 2021 Feb 4;184(3):628-42.
29. Beharier O, Mayo RP, Raz T, Sacks KN, Schreiber L, Suissa-Cohen Y, Chen R, Gomez-Tolub R, Hadar E, Gabbay-Benziv R, Moshkovich YJ. Efficient maternal to neonatal transfer of antibodies against SARS-CoV-2 and BNT162b2 mRNA COVID-19 vaccine. *The Journal of clinical investigation*. 2021 Jul 1;131(13).
30. Rottenstreich A, Zarbiv G, Oiknine-Djian E, Zigron R, Wolf DG, Porat S. Efficient maternofetal transplacental transfer of anti-SARS-CoV-2 spike antibodies after antenatal SARS-CoV-2 BNT162b2 mRNA vaccination. *medRxiv*. 2021 Jan 1.
31. Rasmussen SA, Kelley CF, Horton JP, Jamieson DJ. Coronavirus disease 2019 (COVID-19) vaccines and pregnancy: what obstetricians need to know. *Obstetrics and gynecology*. 2021 Mar;137(3):408.