



REVIEW ARTICLE

Effect of COVID-19 on Pregnant Women and Their Infants

Ahmed Abdel-kareem¹, Nada Eladawy¹, Reham H. Abdel-Kareem²

¹ Undergraduate medical student, Faculty of Medicine, Zagazig University, Zagazig, Egypt

² Human Anatomy & Embryology Department, Faculty of Medicine, Zagazig University, Egypt

Corresponding author:

Ahmed Abdelkareem Undergraduate medical student, Zagazig University, Zagazig, Egypt , Email: ahme25497@gmail.com

Submit Date 2022-03-17

Revise Date 2022-03-24

Accept Date 2022-03-26

ABSTRACT

Background: With a basic replication number of 2-2.5, the Coronavirus disease 2019 (COVID-19) pandemic is spreading swiftly over the world. Pregnant women, fetuses, and infants are anticipated to be a high-risk group during this pandemic. This study aimed to present the consequences of COVID-19 infection on pregnant women and their kids, role of SARS-CoV-2 immunization, breastfeeding as well as the importance of providing care for them throughout the pandemic. COVID-19 positive pregnant women may be asymptomatic or experience mild to severe symptoms, but they are at a higher risk of problems than non-pregnant women. They complicated with fatigue, headache, fever, pneumonia, preterm labor, and early rupture of membranes, in addition to babies' complications including, preterm birth, respiratory distress syndrome, pneumonia, low birth weight, and neurological issues. Some studies proved that, SARS-CoV-2 vaccine is safe during pregnancy, with no high risk of preterm labour or a small for gestational age. However, there may be an increase in the rate of preterm birth during the second trimester. Furthermore, lactating women with confirmed COVID-19 are recommended to continue nursing indicating the benefits of breastfeeding may outweigh the risk of transmission. **Conclusion:** it is critical to provide care to pregnant mothers before and after delivery, as well as their infants during this epidemic. Future researches concentrating on vaccination outcomes were recommended for determining the dangers and benefits of immunization during pregnancy

Keywords:

Pregnancy, COVID-19; Complication; Congenital anomalies; Vaccination



INTRODUCTION

The present COVID-19 pandemic has resulted in a global health disaster unlike any other. The heightened vulnerability of pregnant women raises concerns about maternal and foetal problems[1]. This virus is assumed to be zoonotic in origin and spreads via direct and indirect contact transmission[2].

COVID-19 has most certainly previously been introduced to a substantial number of pregnant women. These findings indicate that the medical community needs to learn more about the effects of COVID-19 and anti-COVID medications on early pregnancy[3].

According to Gajbhiye et al [4], vertical transmission infected some newborns. Earlier researches had shown no indication of vertical transmission in COVID-19, therefore this was one of the first confirmations of this route of transmission.

When the first case of pneumonia was recorded in December 2019, the COVID-19 outbreak quickly spread, causing the World Health Organization to declare the infection a pandemic on March 11th. Although feco-oral transmission has yet to be documented, droplet transmission with virus release in respiratory secretions is the most typical method of transmission, with studies pointing to aerosol transmission as well[5].

The majority of individuals have minor symptoms, but about 20 percent of them have a serious disease. Fever (80–100 percent), cough (59–82 percent), myalgia/fatigue (44–70 percent), and shortness of breath (31–54 percent) are the most common symptoms. Expectoration (28–33 percent), headache (6–17 percent), and diarrhea (2–10 percent) are less common symptoms. In nearly half of all symptomatic patients, pneumonia with bilateral infiltrates or consolidation regions is discovered[1,6].

Laboratory tests reveal lymphopenia, transaminase elevation, proteinuria, and raised lactate dehydrogenase and C-reactive protein levels in the early stages of the disease [7].

The aim of this study was to present the consequences of COVID-19 infection on pregnant women and their kids, role of SARS-CoV-2 immunization, breastfeeding as well as the importance of providing treatment for them throughout the pandemic.

Adverse effects of COVID-19 on mother

Generally, Women have a lower risk of dying or requiring hospitalization or intensive care than men. When compared to their male counterparts of the same age, women of reproductive age had a 60% lower risk of being referred to critical care. Pregnant women do not appear to be more susceptible to infection or significant consequences, but the evidence base is relatively limited, and good studies are hard to come[8].

However, Rasmussen et al., Qadri and Mariona and Yan et al, [9-11] found that pregnant women with COVID-19 have a high mortality rate, which is a very concerning finding. Members of the coronavirus family have been related to serious pregnancy issues such as miscarriage, fetal development restriction, and congenital defects[2]. Complications include severe pneumonia, acute respiratory distress syndrome, cardiac issues, respiratory tract infections, sepsis, and septic shock[8].

Physiological changes in the cardiovascular, pulmonary, and coagulation systems during pregnancy may raise the risk of morbidity. As a result, COVID-19 problems during pregnancy should be detected and addressed as soon as possible. Moreover, co-morbidities (chronic hypertension, gestational diabetes, cardiac disorders, chronic kidney disease, immunosuppression such as in organ transplant recipients, HIV infection, or extended corticosteroid medication) may raise the likelihood of more severe clinical symptoms[2].

The American Society of Reproductive Medicine and other professional organizations recommended that people with confirmed or suspected COVID-19 better to avoid pregnancy or refrain from getting fertility treatments during the outbreak because coronavirus is known to cause mild to severe complications during pregnancy. Only maternal morbidity, eclampsia, and preeclampsia are linked to infected women who are asymptomatic, while, infected women with fever and dyspnea are more likely to have serious maternal and newborn problems[12].

Vertical transmission

According to reports of PCR-based SARS-CoV-2 testing, if infection occurs in utero, during labour or delivery, or whether transmission occurs from an infected mother or asymptomatic hospital employees to the newborn. Antibody tests, on the other hand, have shown new indications of vertical transmission. SARS-CoV-2 immunoglobulin IgM and IgG levels are higher in some children born to mothers who have COVID-19[11]. During pregnancy, IgG can be transmitted from mother to baby, however, IgM has a larger molecular weight and cannot cross the placenta. The discovery of SARS-CoV-2 IgM in the newborn indicates vertical virus transmission, even though all of the infants in the reports so far have been asymptomatic and tested negative for SARS-CoV-2 [13].

Neonatal complications: include bronchopulmonary dysplasia, hypoxic-ischemic encephalopathy, sepsis, anemia, patent ductus arteriosus, intraventricular hemorrhage, necrotizing enterocolitis and retinopathy of prematurity[3].

Congenital anomalies:

COVID-19, either by itself or through anti-COVID medications, has the potential to cause long-term congenital abnormalities. SARS-CoV-2 has been shown to pass across the placental barrier[14] and blood-brain barrier[7], suggesting that if mothers are infected with COVID-19 during early pregnancy, the virus may have a detrimental effect on the etiology of neural tube abnormalities.

Several antiviral medicines and viral infections during early pregnancy have been linked to a higher incidence of neurodevelopmental congenital abnormalities in newborns [15]. Neural tube defects (NTDS) are the most common and serious malformations of the spinal cord (spina bifida) and brain (anencephaly, encephalocele, hydrocephalus) that occur during the first six weeks of pregnancy and affect one in every 1000 newborns worldwide, resulting in permanent neurological complications [16].

Preterm labour in a fifth of cases, foetal distress in a tenth of cases, and premature rupture of membranes were found in a study of pregnant women who were infected with COVID-19 and their newborns. The newborns also had complications such as preterm birth, Respiratory distress syndrome, pneumonia, low birth weight, small for gestational age, stillbirth, and neonatal death [15].

Corticosteroid use

Antenatal corticosteroids have been demonstrated to lower newborn morbidity and mortality in

pregnant women at risk of preterm birth[17]. Early observational data revealed that corticosteroid use in nonpregnant adults with COVID-19 was associated with increased mortality and poorer disease outcomes when given in severe infection, even though findings were not controlled for illness severity or comorbidities [1,18].

The first results of the Randomized Evaluation of COVID-19 Therapy (RECOVERY) trial, on the other hand, showed benefits for 454 non-pregnant participants who were randomized to dexamethasone treatment: mortality was significantly reduced in those who required mechanical ventilation and those who required supplemental oxygen[19].

Even though no pregnant women were included in the first report, the RECOVERY trial's corticosteroid arm was modified to prednisolone or hydrocortisone medication since dexamethasone crosses the placenta. These data suggest that in cases of iatrogenic premature birth in SARS-CoV-2-positive pregnant women due to the maternal disease, corticosteroid therapy should be continued according to current guidelines[20]. Corticosteroid therapy during pregnancy or the postpartum period is possible if the severity of the maternal illness supports it[21].

COVID-19 vaccination:

Wainstock et al. [22] studied a group of 4399 pregnant women, found that 913 (20.6%) of them received one or two immunizations throughout their pregnancy without differences in pregnancy, delivery, or fetal outcomes across the groups. In another trial, data on 1328 pregnant women, 140 of them got at least one dose of the SARS-CoV-2 vaccine, revealing that the vaccinated group had no adverse maternal or fetal effects[23]. A third study compared 712 women who got two doses of the SARS-CoV-2 vaccination versus 1063 women who were not vaccinated. SARS-CoV-2 immunization was found to minimize the incidence of newborn unfavorable composite outcomes and was not linked with maternal composite poor outcomes[24].

In comparison to unprotected women, the SARS-CoV-2 vaccine appears to be safe during pregnancy, with no increased risk of preterm labor and a small for gestational age. However, there may be an increase in the rate of preterm birth among women who are vaccinated during the second trimester. Future researches concentrating on vaccination outcomes by time of vaccination could lead to better knowledge and more accurate patient counseling on the dangers and benefits of immunization during pregnancy [23].

Mortality rates: COVID-19 has a significant mortality rate in elderly individuals and those with one or more co-morbidities. Pregnant and postpartum women (reproductive age) had a mortality rate of 1.3 percent[9-11].

Pregnant women with COVID-19 died in the second and third trimesters from infection, which was followed by cardiopulmonary complications[25]. they had a caesarean delivery 58.3% of the time, 25% had a vaginal delivery, and 16.7% were not full term[26].

Breastfeeding

SARS-CoV-2 is not known to be passed down through the mother's milk. In one case study, breast milk was found to be positive for SARS-CoV-2 four times[27]. Breast milk samples from nine SARS-CoV-2-positive mothers were tested in another study, and none of them came back positive[28]. Even if they tested positive during labor and delivery or the postpartum period, mothers are currently recommended to continue nursing. Women with confirmed COVID-19 should use a medical mask when feeding if one is available, and basic hygiene and hand washing instructions should be followed [29]. The benefits of breastfeeding may outweigh the risk of transmission, given how weak and often silent neonatal infection is.

CONCLUSIONS

It is critical to provide care to pregnant mothers before and after delivery, as well as their infants during this epidemic. The severity of the condition, as well as the time and location of treatment, will all influence the outcome. Furthermore, lactating women with confirmed COVID-19 are recommended to continue nursing. Much of obstetric management is based on consensus and best practice recommendations as clinical efficacy data about COVID-19 immunization, antiviral therapy and corticosteroid use.

Acknowledgement:

We appreciate the educational and technical support from teaching staff in the elective courses "Scientific publishing I and II, Faculty of Medicine Zagazig University".

We appreciate the help of Nourhan A. Abuhashem, Amara Mohamed, Salah Mohammed, Mahmoud Mohammed, Mahmoud Abood and Yara Mohamed.

No conflict of interest

No source of financial support

REFERENCES

1. Guan W-j, Ni Z-y, Hu Y, Liang W-h, Ou C-q, He J-x, et al. Clinical characteristics of coronavirus disease 2019 in China. NEJM. 2020;382(18):1708-20.

2. Kerr SM, Parker SE, Mitchell AA, Tinker SC, Werler MM. Periconceptional maternal fever, folic acid intake, and the risk for neural tube defects. *Ann. Epidemiol.* 2017;27(12):777-82.
3. Di Mascio D, Khalil A, Saccone G, Rizzo G, Buca D, Liberati M, et al. Outcome of coronavirus spectrum infections (SARS, MERS, COVID-19) during pregnancy: a systematic review and meta-analysis. *AJOG.* 2020;2(2):100107.
4. Gajbhiye RK, Modi DN, Mahale SD. Pregnancy outcomes, newborn complications and maternal-fetal transmission of SARS-CoV-2 in women with COVID-19: a systematic review of 441 cases. *MedRxiv.* 2020.
5. Zhao S, Lin Q, Ran J, Musa SS, Yang G, Wang W, et al. Preliminary estimation of the basic reproduction number of novel coronavirus (2019-nCoV) in China, from 2019 to 2020: A data-driven analysis in the early phase of the outbreak. *IJID.* 2020;92:214-7.
6. Wong HYF, Lam HYS, Fong AH-T, Leung ST, Chin TW-Y, Lo CSY, et al. Frequency and distribution of chest radiographic findings in patients positive for COVID-19. *Radiology.* 2020;296(2):E72-E8.
7. Moriguchi T, Harii N, Goto J, Harada D, Sugawara H, Takamino J, et al. A first case of meningitis/encephalitis associated with SARS-Coronavirus-2. *IJID.* 2020;94:55-8.
8. Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *Lancet.* 2020;395(10229):1054-62.
9. Rasmussen S, Jamieson D, Uyeki T. Effects of influenza on pregnant women and infants. *Obstet. Anesth. Dig.* 2013;33(4):208-9.
10. Qadri F, Mariona F. Pregnancy affected by SARS-CoV-2 infection: a flash report from Michigan. *J. Matern. -Fetal Neonatal Med.* 2020;1-3.
11. Yan J, Guo J, Fan C, Juan J, Yu X, Li J, et al. Coronavirus disease 2019 in pregnant women: a report based on 116 cases. *Am. J. Obstet. Gynecol.* 2020;223(1):111. e1-. e14
12. Wei WE, Li Z, Chiew CJ, Yong SE, Toh MP, Lee VJ. Presymptomatic transmission of SARS-CoV-2—Singapore, january 23–march 16, 2020. *MMWR.* 2020;69(14):411.
13. Zeng H, Xu C, Fan J, Tang Y, Deng Q, Zhang W, et al. Antibodies in infants born to mothers with COVID-19 pneumonia. *Jama.* 2020;323(18):1848-9.
14. Dong L, Tian J, He S, Zhu C, Wang J, Liu C, et al. Possible vertical transmission of SARS-CoV-2 from an infected mother to her newborn. *Jama.* 2020;323(18):1846-8.
15. Luteijn J, Brown M, Dolk H. Influenza and congenital anomalies: a systematic review and meta-analysis. *Hum. Reprod.* 2014;29(4):809-23.
16. Blom HJ, Shaw GM, den Heijer M, Finnell RH. Neural tube defects and folate: case far from closed. *Nat. Rev. Neurosci.* 2006;7(9):724-31.
17. Kemp MW, Newnham JP, Challis J, Jobe AH, Stock S. The clinical use of corticosteroids in pregnancy. *Hum. Reprod. Update.* 2016;22(2):240-59.
18. Shang J, Du R, Lu Q, Wu J, Xu S, Ke Z, et al. The treatment and outcomes of patients with COVID-19 in Hubei, China: a multi-centered, retrospective, observational study. 2020.
19. Dhasmana DJ. Dexamethasone in hospitalized patients with Covid-19 *NEJM.* 2021.
20. Klein SL, Flanagan KL. Sex differences in immune responses. *Nat. Rev. Immunol.* 2016;16(10):626-38.
21. Saad AF, Chappell L, Saade GR, Pacheco LD. Corticosteroids in the management of pregnant patients with coronavirus disease (COVID-19) *OB/GYN.* 2020;136(4):823-6.
22. Wainstock T, Yoles I, Sergienko R, Sheiner E. Prenatal maternal COVID-19 vaccination and pregnancy outcomes. *Vaccine.* 2021;39(41):6037-40.
23. Blakeway H, Prasad S, Kalafat E, Heath PT, Ladhani SN, Le Doare K, et al. COVID-19 vaccination during pregnancy: coverage and safety *Am. J. Obstet. Gynecol.* 2022;226(2):236. e1-. e14.24
24. Rottenstreich M, Sela HY, Rotem R, Kadish E, Wiener-Well Y, Grisaru-Granovsky S. Covid-19 vaccination during the third trimester of pregnancy: rate of vaccination and maternal and neonatal outcomes, a multicentre retrospective cohort study. *BJOG: BJOG.* 2022;129(2):248-55.
25. Hantoushzadeh S, Shamshirsaz AA, Aleyasin A, Seferovic MD, Aski SK, Arian SE, et al. Maternal death due to COVID-19. *Am. J. Obstet. Gynecol.* 2020;223(1):109. e1-. e16.
26. Ferrazzi E, Frigerio L, Savasi V, Vergani P, Prefumo F, Barresi S, et al. Mode of delivery and clinical findings in COVID-19 infected pregnant women in Northern Italy. 2020.
27. Groß R, Conzelmann C, Müller JA, Stenger S, Steinhart K, Kirchhoff F, et al. Detection of SARS-CoV-2 in human breastmilk. *Lancet.* 2020;395(10239):1757-8.
28. Chen H, Guo J, Wang C, Luo F, Yu X, Zhang W, et al. Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records. *Lancet.* 2020;395(10226):809-15.
29. Mullins E, Evans D, Viner R, O'Brien P, Morris E. Coronavirus in pregnancy and delivery: rapid review. *Ultrasound Obstet Gynecol.* 2020;55(5):586-92.

To Cite

abdelaziz, A., eladawy, N., Abdel-Kareem, R. Effect of COVID-19 on Pregnant Women and their Infants. *Zagazig University Medical Journal*, 2022; (918-921): -. doi: 10.21608/zumj.2022.126208.2496