Adverse Perinatal Outcomes in COVID-19 Infected Pregnant Women

Subjects: Health Care Sciences & Services Contributor: Malshani Pathirathna

Several adverse maternal, fetal, and neonatal effects were significantly higher in COVID-19 infected pregnant women than non-infected. These included maternal death, preeclampsia, cesarean section delivery, fetal distress, preterm birth, low birth weight, stillbirth, low Apgar score at the fifth minute, and admission to NICU. The comorbidity conditions had no added risk of being infected with COVID-19 infection during pregnancy. Therefore, a COVID-19 infected pregnant woman should be treated with special precautions to avoid and minimize the identified adverse events during perinatal care.

Keywords: COVID-19 ; perinatal outcomes

1. Introduction

Coronavirus disease 2019 (COVID-19), caused by the SARS-CoV-2 virus, continues to be an alarming global public health crisis ^[1] with a sharply escalating number of deaths that have largely surpassed previous fatalities caused by epidemics such as Middle Eastern Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) ^[2]. This situation raises concerns in vulnerable populations such as pregnant mothers, fetuses and their neonates. Pregnant women are at higher risk of developing severe illness from respiratory infections, largely due to immunodeficiency associated with physiological adaptations during pregnancy [3]. Respiratory infections could escalate rapidly to respiratory failure, leading to potentially fatal consequences for both mother and fetus ^[4]. A recent multinational retrospective cohort study of 388 pregnant women reported that SARS-CoV-2 infected pregnant women risk fatal consequences from compromised respiratory functions and need intensive care ^[5]. Healthcare systems continue to become over-burdened, risking compromised access and quality of services. Maternal and child health services are no exceptions to these challenges. Furthermore, low awareness of prevention strategies ^[6], mixed information from the COVID-19 infodemic ^[7], scarcity of healthcare, and intensive care services ^[8] accentuate the negative effects on the populations. Scientifically proven up-to-date evidence of maternal, fetal, and neonatal risks associated with COVID-19 infection in pregnancy is an urgent need to guide clinical decision-making in maternal and child health care. Knowledge of the effects of COVID-19 on pregnancy, childbirth, and postpartum is essential for maternal health care service providers to plan effective management strategies. The prevalence of COVID-19 related adverse perinatal outcomes and the comorbidity profiles of COVID-19 infected pregnant women are essential variables that would help inform care and preventative services.

2. Adverse Perinatal Outcomes in COVID-19 Infected Pregnant Women

Six reported that COVID-19 infection during pregnancy was not associated with adverse perinatal outcome ^{[9][10][11][12][13]} ^[14]. A study conducted in Spain concluded that even with no difference in the overall rate of adverse perinatal outcomes among COVID -19 infected women, symptomatic status was associated with a modest increase in preterm delivery and intrapartum fetal distress ^[10]. All of the other studies reported one or more significant adverse perinatal outcomes associated with COVID-19 in pregnancy (**Table 1**).

| Study | The Outcome of the Study (Comparison of COVID 19 Infected and Non-Infected Pregnant Women) \ddagger | | | | |
|--|---|---|-------------------|--------------------------------|--|
| | Increased Risk/No Difference | Maternal Risk/s | Fetal Risk/s | Neonatal Risk/s | |
| Abedzadeh-Kalahroudi et al., 2021 ^[15] | Increased risk | Preeclampsia, cesarean section delivery | Fetal distress | Preterm birth, low Apgar score | |
| Adhikari et al., 2020 ^[9] | No difference | | | | |

Table 1. Summary findings of individual studies.

| | The Outcome of the Study (Comparison of COVID 19 Infected and Non-Infected Pregnant Women) | | | | | |
|--|--|-----------------------------------|------------------------|---|--|--|
| Study | Increased Risk/No Difference | Maternal Risk/s | Fetal Risk/s | Neonatal Risk/s | | |
| Cardona-Pe'rez et al., 2021 ^[16] | Increased risk | Preeclampsia | | | | |
| Crovetto et al., 2021 ^[10] † | No difference | | | | | |
| Cruz-Lemini et al., 2021 [17] †† | Increased risk | Pre-labor rupture of membranes | | | | |
| Farghaly et al., 2020 ^{[<u>18]</u>} | Increased risk | Cesarean section delivery | | Low mean Apgar score at the fifth minute | | |
| Gupta et al., 2021 ^[19] | Increased risk | Cesarean section delivery | Fetal distress | Preterm birth, low birth weight, low Apgar score | | |
| Hcini et al., 2021 ^[20] | Increased risk | | Intra-uterine death | | | |
| Katz et al., 2021 ^[21] | Increased risk | | | Preterm birth | | |
| Ko et al., 2021 ^[22] | Increased risk | Maternal death | | Preterm birth | | |
| Liu et al., 2021 ^[11] | No difference | | | | | |
| Martinez-Perez et al., 2021 ^[23] | Increased risk | Pre-labor rupture of membranes | | Preterm birth, neonatal intensive care unit admission | | |
| Nayak et al., 2020 ^[24] | Increased risk | Cesarean section delivery | | | | |
| Norman et al., 2021 ^[25] | Increased risk | | | Neonatal intensive care unit admission | | |
| Prabhu et al., 2020 ^[26] | Increased risk | Cesarean section delivery | | | | |
| Ríos-Silva et al., 2020 [<u>12]</u> | No difference | | | | | |
| Steffen et al., 2021 ^[13] | No difference | | | | | |
| Trahan et al., 2021 ^[14] | No difference | | | | | |
| Villar et al., 2021 ^[27] | Increased risk | Maternal death, preeclampsia | | Preterm birth | | |
| Vousden et al., 2021 ^[28] | Increased risk | Cesarean section delivery | | Neonatal intensive care unit admission | | |

[‡] Relevant to the studied perinatal outcomes in the current systematic review, [†] No difference in the overall rates but the symptomatic status was associated with modest increases in preterm delivery and intrapartum fetal distress, ^{††} Study encompassed only the asymptomatic pregnant women. One study was not included in the table as its outcome was based on disease severity ^[16].

We conducted this systematic review to pool the available evidence of adverse perinatal outcomes caused by COVID-19 infection in pregnancy. We retrieved a total of 21 observational studies that assessed the adverse perinatal outcomes in pregnant women with COVID-19 infection published from December 2019 to June 2021.

Overall findings were, (1) the reported incidence rates of COVID-19 infection among pregnant women ranged from 1.3% to 27%, disregarding the fact that the results were based on single-center studies to multinational studies; (2) with regards to the adverse maternal outcomes, it was found that there was a statistically significant increase in maternal deaths, preeclampsia, and cesarean deliveries, while miscarriages/abortions, PROMs/PPROMs, and operative vaginal births were non-significant in COVID-19 infected pregnant women compared to non-infected; (3) with regards to the adverse fetal outcomes, fetal distress was found to be statistically significant, while intrauterine death was non-significant in COVID-19 infected pregnants to the adverse neonatal outcomes, all reported fetal outcomes except neonatal death, including preterm birth, low birth weight, stillbirth, fifth minute Apgar score < 7, and admissions to NICU showed significant differences in births to COVID-19 infected women compared to non-infected.

3. Implications for Clinical Practice

Healthcare providers should be aware that women infected with COVID-19 have an elevated risk of disease severity, including maternal mortality. Pregnant women should be advised of the disease's increased severity and encouraged to take precautions to avoid infection. Primary healthcare providers will need to balance the necessity for routine multidisciplinary prenatal care and the management of women suspected of having COVID-19 infection, preferably via virtual antenatal clinics. Pregnant women who become infected with COVID-19 before reaching term may require management in a tertiary healthcare facility equipped with cesarean section and NICU facilities to manage preterm infants, infants with low Apgar scores, and infants with fetal distress.

References

- 1. World Health Organization. Situation Report—85: Coronavirus Disease 2019 (COVID-19). 2020. Available online: https://www.who.int/publications/m/item/situation-report---85 (accessed on 5 October 2021).
- Peeri, N.C.; Shrestha, N.; Rahman, M.S.; Zaki, R.; Tan, Z.; Bibi, S.; Baghbanzadeh, M.; Aghamohammadi, N.; Zhang, W.; Haque, U. The SARS, MERS and novel coronavirus (COVID-19) epidemics, the newest and biggest global health threats: What lessons have we learned? Int. J. Epidemiol. 2020, 49, 717–726.
- 3. Beigi, R.H. Emerging Infectious Diseases in Pregnancy. Obstet. Gynecol. 2017, 129, 896–906.
- 4. Lapinsky, S.E. Acute respiratory failure in pregnancy. Obstet. Med. 2015, 8, 126-132.
- 5. WAPM (World Association of Perinatal Medicine) Working Group on COVID-19. Maternal and perinatal outcomes of pregnant women with SARS-CoV-2 infection. Ultrasound Obstet. Gynecol. 2021, 57, 232–241.
- Kuang, J.; Ashraf, S.; Das, U.; Bicchieri, C. Awareness, Risk Perception, and Stress during the COVID-19 Pandemic in Communities of Tamil Nadu, India. Int. J. Environ. Res. Public Health 2020, 17, 7177.
- World Health Organization. The COVID-19 Infodemic. 2021. Available online: https://www.who.int/healthtopics/infodemic/the-covid-19-infodemic#tab=tab_1 (accessed on 5 December 2021).
- Sprung, C.L.; Joynt, G.M.; Christian, M.D.; Truog, R.D.; Rello, J.; Nates, J.L. Adult ICU Triage During the Coronavirus Disease 2019 Pandemic: Who Will Live and Who Will Die? Recommendations to Improve Survival. Crit. Care Med. 2020, 48, 1196–1202.
- Adhikari, E.H.; Moreno, W.; Zofkie, A.C.; Macdonald, L.; McIntire, D.D.; Collins, R.R.J.; Spong, C.Y. Pregnancy Outcomes Among Women With and Without Severe Acute Respiratory Syndrome Coronavirus 2 Infection. JAMA Netw. Open 2020, 3, e2029256.
- Crovetto, F.; Crispi, F.; Llurba, E.; Pascal, R.; Larroya, M.; Trilla, C.; Camacho, M.; Medina, C.; Dobaño, C.; Gomez-Roig, M.D.; et al. Impact of Severe Acute Respiratory Syndrome Coronavirus 2 Infection on Pregnancy Outcomes: A Population-based Study. Clin. Infect. Dis. 2021, 73, 1768–1775.
- Liu, C.; Andrusier, M.; Silver, M.; Applewhite, L.; Clare, C.A. Effect of SARS-CoV-2 Infection on Pregnancy Outcomes in an Inner-City Black Patient Population. J. Community Health 2021, 46, 1029–1035.
- 12. Ríos-Silva, M.; Murillo-Zamora, E.; Mendoza-Cano, O.; Trujillo, X.; Huerta, M. COVID-19 mortality among pregnant women in Mexico: A retrospective cohort study. J. Glob. Health 2020, 10, 020512.
- Steffen, H.A.; Swartz, S.R.; Jackson, J.B.; Kenne, K.A.; Ten Eyck, P.P.; Merryman, A.S.; Castaneda, C.N.; Marsden, K.; Maxwell, T.; Merrill, A.E.; et al. SARS-CoV-2 Infection during Pregnancy in a Rural Midwest All-delivery Cohort and Associated Maternal and Neonatal Outcomes. Am. J. Perinatol. 2021, 38, 614–621.
- Trahan, M.-J.; Malhamé, I.; O'Farrell, P.; Mitric, C.; Desilets, J.; Bastrash, M.P.; El-Messidi, A.; Abenhaim, H.A. Obstetrical and Newborn Outcomes Among Patients With SARS-CoV-2 During Pregnancy. J. Obstet. Gynaecol. Can. 2021, 43, 888–892.e1.
- 15. Abedzadeh-Kalahroudi, M.; Sehat, M.; Vahedpour, Z.; Talebian, P. Maternal and neonatal outcomes of pregnant patients with COVID-19: A prospective cohort study. Int. J. Gynecol. Obstet. 2021, 153, 449–456.
- 16. Cardona-Pérez, J.A.; Villegas-Mota, I.; Helguera-Repetto, A.C.; Acevedo-Gallegos, S.; Rodríguez-Bosch, M.; Aguinaga-Ríos, M.; Coronado-Zarco, I.; León-Juárez, M.; Aguilar-Ayala, D.; Valdespino-Vázquez, M.Y.; et al. Prevalence, clinical features, and outcomes of SARS-CoV-2 infection in pregnant women with or without mild/moderate symptoms: Results from universal screening in a tertiary care center in Mexico City, Mexico. PLoS ONE 2021, 16, e0249584.

- 17. Cruz-Lemini, M.; Ferriols Perez, E.; de la Cruz Conty, M.L.; Aguilar, A.C.; Pardilla, M.B.E.; Rodríguez, P.P.; Hernando, M.M.; Acebal, L.F.; Recarte, P.P.; Mallen, M.d.M.; et al. Obstetric Outcomes of SARS-CoV-2 Infection in Asymptomatic Pregnant Women. Viruses 2021, 13, 112.
- 18. Farghaly, M.A.; Kupferman, F.; Castillo, F.; Kim, R.M. Characteristics of Newborns Born to SARS-CoV-2-Positive Mothers: A Retrospective Cohort Study. Am. J. Perinatol. 2020, 37, 1310–1316.
- Puneet, G.; Surender, K.; Sudhan, S.S. SARS-CoV-2 prevalence and maternal-perinatal outcomes among pregnant women admitted for delivery: Experience from COVID-19-dedicated maternity hospital in Jammu, Jammu and Kashmir (India). J. Med. Virol. 2021, 93, 5505–5514.
- Hcini, N.; Maamri, F.; Picone, O.; Carod, J.F.; Lambert, V.; Mathieu, M.; Carles, G.; Pomar, L. Maternal, fetal and neonatal outcomes of large series of SARS-CoV-2 positive pregnancies in peripartum period: A single-center prospective comparative study. Eur. J. Obstet. Gynecol. Reprod. Biol. 2021, 257, 11–18.
- 21. Katz, D.; Bateman, B.T.; Kjaer, K.; Turner, D.P.; Spence, N.Z.; Habib, A.S.; George, R.B.; Toledano, R.D.; Grant, G.; Madden, H.E.; et al. The Society for Obstetric Anesthesia and Perinatology Coronavirus Disease 2019 Registry: An Analysis of Outcomes Among Pregnant Women Delivering During the Initial Severe Acute Respiratory Syndrome Coronavirus-2 Outbreak in the United States. Anesth. Analg. 2021, 133, 462–473.
- 22. Ko, J.Y.; DeSisto, C.L.; Simeone, R.M.; Ellington, S.; Galang, R.R.; Oduyebo, T.; Gilboa, S.M.; Lavery, A.M.; Gundlapalli, A.V.; Shapiro-Mendoza, C.K. Adverse Pregnancy Outcomes, Maternal Complications, and Severe Illness Among US Delivery Hospitalizations With and Without a Coronavirus Disease 2019 (COVID-19) Diagnosis. Clin. Infect. Dis. 2021, 73, S24–S31.
- 23. Martinez-Perez, O.; Rodriguez, P.P.; Hernandez, M.M.; Pardilla, M.B.; Perez, N.P.; Hernandez, M.R.; Yarza, A.V.; Velasco, O.N.; Fernandez, P.G.; Acebal, L.F.; et al. The association between SARS-CoV-2 infection and preterm delivery: A prospective study with a multivariable analysis. BMC Pregnancy Childbirth 2021, 21, 273.
- 24. Nayak, A.H.; Kapote, D.S.; Fonseca, M.; Chavan, N.; Mayekar, R.; Sarmalkar, M.; Bawa, A. Impact of the Coronavirus Infection in Pregnancy: A Preliminary Study of 141 Patients. J. Obstet. Gynaecol. India 2020, 70, 256–261.
- Norman, M.; Navér, L.; Söderling, J.; Ahlberg, M.; Askling, H.H.; Aronsson, B.; Byström, E.; Jonsson, J.; Sengpiel, V.; Ludvigsson, J.F.; et al. Association of Maternal SARS-CoV-2 Infection in Pregnancy With Neonatal Outcomes. JAMA 2021, 325, 2076–2086.
- Prabhu, M.; Cagino, K.; Matthews, K.C.; Friedlander, R.L.; Glynn, S.M.; Kubiak, J.M.; Yang, Y.J.; Zhao, Z.; Baergen, R.N.; DiPace, J.I.; et al. Pregnancy and postpartum outcomes in a universally tested population for SARS-CoV-2 in New York City: A prospective cohort study. BJOG 2020, 127, 1548–1556.
- 27. Villar, J.; Ariff, S.; Gunier, R.B.; Thiruvengadam, R.; Rauch, S.; Kholin, A.; Roggero, P.; Prefumo, F.; do Vale, M.S.; Cardona-Perez, J.A.; et al. Maternal and Neonatal Morbidity and Mortality Among Pregnant Women With and Without COVID-19 Infection: The INTERCOVID Multinational Cohort Study. JAMA Pediatr. 2021, 175, 817–826.
- 28. Vousden, N.; Bunch, K.; Morris, E.; Simpson, N.; Gale, C.; O'Brien, P.; Quigley, M.; Brocklehurst, P.; Kurinczuk, J.J.; Knight, M. The incidence, characteristics and outcomes of pregnant women hospitalized with symptomatic and asymptomatic SARS-CoV-2 infection in the UK from March to September 2020: A national cohort study using the UK Obstetric Surveillance System (UKOSS). PLoS ONE 2021, 16, e0251123.

Retrieved from https://encyclopedia.pub/entry/history/show/44179