

Impact of COVID-19 on Pregnancy and Newborns: A Brief Review

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ABSTRACT

The COVID-19 pandemic, caused by the SARS-CoV-2 virus, has posed significant challenges to maternal and infant health worldwide. Initial studies suggested that pregnant women were not at increased risk of severe infection compared to the general population. However, subsequent evidence demonstrated an increase in maternal and neonatal morbidity and mortality associated with the disease. Physiological changes in pregnancy, such as immunomodulation, increased cardiac output, and reduced pulmonary capacity, may worsen the clinical course of COVID-19. Additionally, obstetric complications such as preterm birth, preeclampsia, and intrauterine growth restriction have shown a higher incidence in infected pregnant women. In the perinatal period, exposed neonates may present with respiratory syndrome and require admission to neonatal ICU, although direct neonatal mortality due to COVID-19 remains rare. Care protocols, including corticosteroids for lung maturation, fetal monitoring, and postnatal transmission reduction strategies, have been adapted by major international organizations. Breastfeeding and skin-to-skin contact recommendations balance the risk of infection with the immunological benefits of breast milk.

Keywords: COVID-19; pregnancy; newborn; vertical transmission; perinatal outcomes

Introduction

Since the World Health Organization (WHO) declared COVID-19 a global pandemic on March 11, 2020, the SARS-CoV-2 virus has infected over 500 million people worldwide, resulting in more than 6 million deaths¹. Pregnant women have historically been considered vulnerable to severe acute respiratory infections due to the physiological and immunological changes of pregnancy. These adaptations include an immunotolerant state to prevent fetal rejection, increased cardiac output, plasma volume expansion, and reduced pulmonary functional reserve, which can exacerbate the course of viral respiratory infections².

Early studies, primarily from small Chinese cohorts, suggested that pregnant women had clinical courses similar to nonpregnant women, without a significant increase in ICU admissions or need for ventilatory support. However, broader analyses and meta-analyses have demonstrated increased maternal morbidity and mortality compared to the pre-pandemic obstetric population. In a systematic review and meta-analysis involving over 90,000 pregnant women, Allotey, et al.³ found that symptomatic pregnant women with COVID-19 were at least twice as likely to require ICU admission and mechanical ventilation³. Furthermore, obstetric complications such as preeclampsia, intrauterine growth restriction (IUGR), and preterm birth have been more frequently reported in SARS-CoV-2-infected pregnant women. Di Mascio, et al.⁴, in a meta-analysis of 79 studies, observed a preterm birth rate of approximately 21% among COVID-19-positive pregnant women-much higher than the global pre-pandemic rate of 10–12%⁴. Most of these preterm births appear to be iatrogenic, driven by severe maternal illness or related complications.

The possibility of vertical transmission of SARS-CoV-2 from mother to fetus has been widely investigated since early reports of viral RNA in amniotic fluid, placenta, and umbilical cord blood⁵. However, actual rates of congenital infection remain low. Studies such as Juan, et al.⁶ found intrauterine transmission rates below 2%, suggesting the placental barrier is largely effective⁶. Reports of neonatal IgM antibodies⁷ and symptomatic neonates immediately post-birth are rare, reinforcing the notion that vertical transmission is uncommon and likely dependent on still unclear factors⁷. Most neonates born to COVID-19-positive mothers have favorable outcomes. Kearns, et al.⁸ noted that fewer than 5% required NICU admission due to respiratory distress, and direct neonatal mortality due to COVID-19 was virtually nonexistent, though complications from preterm birth remain a concern⁸.

Maternal and child health guidelines were quickly adapted to the new reality. The U.S. Centers for Disease Control and Prevention⁹ updated management protocols, recommending antenatal corticosteroids for fetal lung maturation in at-risk pregnancies and thromboembolism prophylaxis for hospitalized pregnant women with COVID-19⁹. WHO, in collaboration with UNICEF and UNFPA, emphasized that breastfeeding should continue with appropriate precautions (mask use, hand hygiene) due to the immunological benefits of breast milk and the low likelihood of viral transmission via breast secretions (WHO; UNICEF; UNFPA, 2020). In this context, this article aims to comprehensively review current evidence on the impact of COVID-19 on pregnancy and newborns, addressing: (1) the pathophysiological mechanisms that increase maternal

vulnerability; (2) major maternal and obstetric complications; (3) vertical transmission risks and rates; (4) neonatal outcomes; and (5) clinical and perinatal management recommendations.

Objectives

This article reviews current evidence on the impact of COVID-19 on pregnancy and newborns, discussing pathophysiological mechanisms, perinatal risks, clinical management, and maternal and neonatal outcomes.

Materials and Methods

A literature review was conducted using the PubMed, SciELO, Google Scholar, and ScienceDirect databases.

Discussion

Current evidence confirms that pregnancy induces physiological changes that may exacerbate the clinical course of COVID-19. Immunological modifications, including reduced CD8+ T-cell antiviral activity and a cytokine profile shift toward Th2 responses, may impair viral clearance². Respiratorily, uterine enlargement displaces the diaphragm, reducing pulmonary compliance and functional residual capacity, contributing to rapid desaturation during viral pneumonia. Meta-analyses indicate that pregnant women are at higher risk of ICU admission and mechanical ventilation compared to age-matched nonpregnant women³. Comorbidities especially obesity, diabetes, and hypertension-worsen this risk, as supported by Allotey et al. and the CDC COVID-19 Pregnancy Surveillance reports¹⁰. High-risk obstetric care quickly adapted to new protocols. Antenatal corticosteroids remain standard for fetal lung maturation in preterm labor (<34 weeks), as they do not increase maternal complications from COVID-19¹¹. Low-molecular-weight heparin is recommended for thromboprophylaxis due to the increased thrombotic risk from both pregnancy and COVID-19-related inflammatory coagulopathy.

Obstetric outcomes show increased rates of preeclampsia among infected mothers. Knight, et al.¹² reported a 13% incidence of preeclampsia in infected pregnant women compared to 5–8% in the general pregnant population¹². This may be linked to uteroplacental vascular constriction and systemic inflammation. Vertical transmission, while possible, remains rare. Vivanti, et al.⁵ described transplacental infection confirmed via PCR in amniotic fluid and placental tissue, but symptomatic neonatal cases are isolated⁵. Placental barriers, including syncytiotrophoblasts and low ACE2 expression in placental villi, provide effective protection⁶. Moreover, the presence of maternal IgG antibodies in neonates suggests passive immunity transfer.

For newborns, morbidity is mainly associated with preterm birth, often necessary to preserve maternal health. Kearns et al. found that about 15% of neonates required ventilatory support, but direct neonatal mortality from SARS-CoV-2 was <1%⁸. Rooming-in with precautions (masking, hygiene) is encouraged by WHO, UNICEF, and UNFPA, as the immunological benefits of breastfeeding such as secretory IgA and bioactive compounds-outweigh the minimal risk of postnatal transmission (WHO; UNICEF; UNFPA, 2020). Viral RNA in breast milk has been inconsistently detected, and transmission via breastfeeding remains unproven.

Limitations in the literature include: (1) predominance of retrospective studies and case series; (2) heterogeneity in

diagnostic criteria and outcome measures; (3) lack of matched controls in some cohorts; and (4) short postnatal follow-up periods. These gaps call for prospective, multicenter cohorts with standardized protocols and long-term child development assessment. Finally, COVID-19 vaccination in pregnancy has proven safe and effective in reducing severe maternal outcomes. Recent observational studies report significant reductions in ICU admissions and hospitalizations among vaccinated pregnant women, without increased obstetric or neonatal complications, supporting universal vaccination during any trimester¹³.

Conclusion

The COVID-19 pandemic has highlighted unique challenges in maternal and child health. While essential for maintaining pregnancy, physiological and immunological changes render pregnant women more susceptible to severe respiratory infections like COVID-19. Robust meta-analyses have confirmed that pregnant women with SARS-CoV-2 face higher risks of ICU admission, mechanical ventilation, and thromboembolic events compared to nonpregnant women^{3,10}. Obstetric complications including preeclampsia, IUGR, and preterm birth directly affect neonatal outcomes. Although many preterm births are iatrogenic due to maternal health deterioration, they result in increased NICU admissions and long-term morbidity, especially among very preterm infants^{4,12}.

Vertical transmission remains rare, with rates below 2%, likely due to effective placental barriers and low ACE2 expression in trophoblastic cells. Isolated cases do not warrant discontinuation of breastfeeding, which offers essential early-life immune protection^{1,5}. Clinical management of pregnant women with COVID-19 should include: (1) intensive maternal oxygen monitoring; (2) antenatal corticosteroids for at-risk preterm births; (3) thromboembolism prophylaxis; and (4) delivery in facilities with trained multidisciplinary teams. For newborns, rooming-in with precautions and early ventilatory support, when necessary, are key strategies. Maternal vaccination has been shown to prevent severe disease and is strongly recommended during any trimester (Smith et al., 2021). Current knowledge gaps include: (1) long-term effects of maternal infection on child neurodevelopment; (2) variability in passive immunity among neonates; and (3) the impact of emerging variants on maternal-neonatal morbidity and mortality. Prospective cohorts and long-term studies are crucial to address these questions and improve care protocols. Overall, while pregnant women are at higher risk for severe COVID-19, evidence-based practices including vaccination, targeted obstetric management, and safe breastfeeding can significantly reduce maternal and neonatal morbidity and mortality. Integrating healthcare services, ongoing research, and epidemiological surveillance are essential pillars for ensuring favorable outcomes in this highly vulnerable population¹⁴.

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