

# Neonatal Birth Characteristics Following Antenatal Maternal Covid-19 Infection



Tiffany J Emery MS3<sup>1</sup>, Kati N Baillie MS3<sup>1</sup>, Heather A Pratt-Chavez MD<sup>2</sup>, Conra S Lacy RN<sup>2</sup>, Jessie R Maxwell MD<sup>2,3</sup>

<sup>1</sup>University of New Mexico School of Medicine, Albuquerque, NM, US

<sup>2</sup>Department of Pediatrics, University of New Mexico, Albuquerque, NM, US

<sup>3</sup>Department of Neurosciences, University of New Mexico, Albuquerque, NM, US



## Background

Severe Acute Respiratory Syndrome Coronavirus-1 (SARS CoV-1) and Middle East Respiratory Syndrome (MERS), two illnesses caused by a coronavirus, have been shown to affect maternal and neonatal morbidity and mortality.<sup>1-6</sup> Coronavirus disease 2019 (COVID-19), also known as Severe Acute Respiratory Syndrome Coronavirus-2 (SARS CoV-2), has been shown to affect vasculature and cause placental changes such as microcalcifications, increased fibrin, and thrombi formation.<sup>7, 8-11</sup>

Furthermore, the placenta is a vital organ of pregnancy that plays a key role in both maternal and fetal health. It serves many functions to the developing fetus including endocrine regulation, waste removal, providing a barrier against infection, and transport of nutrients.<sup>12-16</sup>

Significant remodeling of the placenta occurs at the end of the first trimester and beginning of the second trimester. Therefore, insults during this crucial time for development can affect the placenta's overall size and functional capacity.<sup>12,15,17</sup>

These changes have been hypothesized to contribute to intrauterine fetal growth restriction (IUGR). Importantly, initial studies have demonstrated that the majority of mothers infected with Covid-19 during pregnancy and neonates born to Covid-19 positive mothers experience good outcomes.<sup>2,3,7,18</sup>

## Objectives

1. To obtain the birth characteristics including gestational age and birth weight from infants that were born to mothers with COVID-19 infection during pregnancy.
2. We will complete a sub-analysis to look at the impact of infection during the first, second, and third trimester of pregnancy on the birth characteristics of the infants.
3. We will complete a chart review of 100 healthy women as the control group to compare the outcomes of those with COVID-19 infection during pregnancy.

## Methods

We will conduct a retrospective chart review of all women who tested positive for COVID-19 during pregnancy or at the time of delivery and their infants from March 1, 2020 – April 1, 2021 at a single academic institution. In addition, we will also conduct a retrospective chart review of 100 healthy women during the same time to serve as the control group in order to compare the outcomes of those with and those without COVID-19 infection during pregnancy.

Selection of Patients:

The inclusion criteria are defined as

- 1) Any women with a positive pregnancy test and positive COVID-19 screening test between 3/1/20 – 4/1/21
- 2) Women must have delivered the infant at UNMH
- 3) Women with a positive pregnancy test and no other known complications will be included as the control group

Regarding exclusion criteria, as this is a retrospective chart review, if the inclusion criteria are met, the mother infant dyad will be included.

No specific ages will be excluded. If a woman has a positive pregnancy test and positive COVID-19 test, they will be included.

## Anticipated Results

Our data collection and statistical analysis are currently ongoing.

However, given the possible effects of Covid-19 infections on the placenta and, therefore, the developing fetus, we anticipate that antenatally acquired maternal Covid-19 infections will negatively impact fetal growth. We anticipate that neonates born to mothers who acquired Covid-19 infection during pregnancy will be smaller at birth compared to neonates born to mothers that were not exposed to Covid-19 during pregnancy.

Additionally, given the crucial period for placental remodeling, we anticipate that timing of antenatal infections will have varying effects on neonatal weight at birth.

**Disclosure:** All authors of this presentation have no disclosures concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation.

## Discussion

As Covid-19 is a novel coronavirus, more research is needed to characterize the rate of antenatal complications due to Covid-19 and whether timing of infection has variable effects on fetal growth.

The CDC reported data between March 2020 – January 2021 from participating jurisdictions on 9,383 pregnant women with COVID-19 infections. Of these women, data on timing of infection was only available for 6,313 women of which 71% of infections occurred in the third trimester.<sup>19</sup> Therefore, we would expect that the placenta would not be undergoing significant vascular remodeling during what appears to be the most common timing of infection.

There are limited studies regarding this topic, but one study evaluating 55 cases of Covid-19 infection during pregnancy reported IUGR affecting approximately 10% of COVID-19 pregnancies.<sup>18</sup> Other studies evaluating the pooled rate of complications for all coronavirus infections including SARS CoV-1, MERS, and Sars CoV-2 reported a rate of IUGR ranging from 2.8% to 40%, depending on the study. Given the limited literature and the wide variability, we hope our study will help to shed more light on COVID-19 and its effects on mothers and neonates.<sup>1,2,6</sup>

## References

1. Diriba K, Awulachew E, Getu E. The effect of coronavirus infection (SARS-CoV-2, MERS-CoV, and SARS-CoV) during pregnancy and the possibility of vertical maternal-fetal transmission: a systematic review and meta-analysis. *Eur J Med Res.* 2020 Sep 4;25(1):39.
2. Bahadur G, Homburg R, Yoong W, et al. Adverse outcomes in SAR-CoV-2 (COVID-19) and SARS virus related pregnancies with probable vertical transmission. *JBRA Assist Reprod.* 2020 Jul 14;24(3):351-357.
3. Wang CL, Liu YY, Wu CH, Wang CY, Wang CH, Long CY. Impact of COVID-19 on Pregnancy. *Int J Med Sci.* 2021 Jan 1;18(3):763-767.
4. Cavalcante MB, Cavalcante CTMB, Sarno M, Barini R, Kwak-Kim J. Maternal immune responses and obstetrical outcomes of pregnant women with COVID-19 and possible health risks of offspring. *J Reprod Immunol.* 2021;143:103250.
5. Dang D, Wang L, Zhang C, Li Z, Wu H. Potential effects of SARS-CoV-2 infection during pregnancy on fetuses and newborns are worthy of attention. *J Obstet Gynaecol Res.* 2020;46(10):1951-1957.
6. Di Mascio D, Khalil A, Saccone G, Rizzo G, Buca D, Liberati M, Vecchiet J, Nappi L, Scambia G, Berghella V, D'Antonio F. Outcome of coronavirus spectrum infections (SARS, MERS, COVID-19) during pregnancy: a systematic review and meta-analysis. *Am J Obstet Gynecol MFM.* 2020 May;2(2):100107.
7. Golden TN, Simmons RA. Maternal and neonatal response to COVID-19. *Am J Physiol Endocrinol Metab.* 2020;319(2):E315-E319.
8. Tabary M, Khanmohammadi S, Araghi F, Dadkhahfar S, Tavangar SM. Pathologic features of COVID-19: A concise review. *Pathol Res Pract.* 2020;216(9):153097.
9. Singh N, Buckley T, Shertz W. Placental Pathology in COVID-19: Case Series in a Community Hospital Setting. *Cureus.* 2021 Jan 6;13(1):e12522.
10. Schwartz DA, Morotti D. Placental Pathology of COVID-19 with and without Fetal and Neonatal Infection: Trophoblast Necrosis and Chronic Histiocytic Intervillositis as Risk Factors for Transplacental Transmission of SARS-CoV-2. *Viruses.* 2020 Nov 15;12(11):1308.
11. Shanes ED, Mithal LB, Otero S, Azad HA, Miller ES, Goldstein JA. Placental Pathology in COVID-19. *Am J Clin Pathol.* 2020 Jun 8;154(1):23-32.
12. Sánchez-Luna M, Fernández Colomer B, de Alba Romero C et al. Neonates Born to Mothers With COVID-19: Data From the Spanish Society of Neonatology Registry. *Pediatrics.* 2021;147(2):e2020015065.
13. Turco M, Moffett A. Development of the human placenta. *Development.* 2019;146(22):dev163428.
14. Gude N, Roberts C, Kalionis B, King R. Growth and function of the normal human placenta. *Thromb Res.* 2004;114(5-6):397-407.
15. Burton G, Jauniaux E. Development of the Human Placenta and Fetal Heart: Synergic or Independent?. *Front Physiol.* 2018;9.
16. Wastnedge EAN, Reynolds RM, van Boeckel SR, et al. Pregnancy and COVID-19. *Physiol Rev.* 2021;101(1):303-318.
17. Burton GJ, Jauniaux E. Pathophysiology of placental-derived fetal growth restriction. *Am J Obstet Gynecol.* 2018 Feb;218(2S):S745-S761.
18. Dashraath P, Wong J.L.J., Lim M.X.K., et al. Coronavirus disease 2019 (COVID-19) pandemic and pregnancy. *Am J Obstet Gynecol.* 2020;222(6):521-531.
19. Data on COVID-19 during Pregnancy: Birth and Infant Outcomes. Centers for disease control and prevention Web site. <https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/special-populations/birth-data-on-covid-19.html>. January 21, 2021. Accessed February 13, 2021.