



A Critical Review of the Coronavirus Disease (COVID-19) during Pregnancy & Risk of Vertical Transmission in the United States

Zebi Fatima^{1*}

¹*Internal Medicine, Marshfield Clinic Health Systems, Marshfield, WI 54449,
United States of America.*

Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

Article Information

DOI: 10.9734/IJTDH/2020/v41i1830375

Editor(s):

- (1) Dr. Romulo Dias Novaes, Federal University of Alfnas, Brazil.
- (2) Dr. Cihad Dundar, Ondokuz Mayıs University, Turkey.
- (3) Dr. Giuseppe Murdaca, University of Genoa, Italy.

Reviewers:

- (1) Abhilash Perisetti, University of Arkansas, USA.
- (2) Sarapultsev Alexey, Ural Federal University, Russian Federation.
- (3) Terhemen Joseph Igbudu, Benue State University Teaching Hospital, Nigeria.
- (4) Azam Amirian, Jiroft University of Medical Sciences, Iran.
- (5) Antonio Neres Norberg, UNIABEU University Center, Brazil.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/61930>

Review Article

Received 25 August 2020
Accepted 31 October 2020
Published 30 November 2020

ABSTRACT

Since December 2019, people around the world have been affected by a pandemic disease caused by a novel type of betacoronavirus. It can lead to severe contagious respiratory illness. The experts are concerned about the effects of this novel virus on both the mother and their fetuses. This review is to identify strategies for the obstetric management of women diagnosed with COVID-19 and the best neonatal care for their newborns.

We conducted a comprehensive literature search using PubMed, ELSEVIER and CDC web page and included the articles published from December 2019 through July 2020. Inclusion criteria were original articles published between December 2019 and July 2020 and Meta-Analysis, Reviews and, Systematic Reviews.

Regarding vertical transmission, several studies concluded that there is no evidence for intrauterine vertical transmission of COVID-19 from infected mothers to their babies. Pregnant women with COVID-19 might develop more severe respiratory complications. After delivery, women with

*Corresponding author: Email: zebifatima@gmail.com, fatima.zebi@marshfieldclinic.org;

COVID-19 can transmit the virus to their babies through respiratory droplets during breastfeeding or care, so experts recommend to adopt hygienic measures. The current information shows that COVID-19 infection apparently is not associated with greater severity of the disease in pregnant women than in the general population. However, the data is minimal, and that represents a challenge for the obstetric care providers.

Keywords: COVID-19; pregnancy; neonatal; betacoronavirus; SARS-CoV-2; transmission.

1. INTRODUCTION

Since December 2019, people around the world have been affected by a pandemic disease caused by a novel type of betacoronavirus. It is commonly called coronavirus disease, COVID-19, or SARS-CoV-2. As other coronaviruses described to date, it can lead to severe contagious respiratory illness. It has a high virulence and contagiousness, whereby it has caused the disease and death of millions of people around the world [1].

Just in the USA, there are more than 3.952.273 people infected with COVID-19 (until July 23). Therefore, healthcare providers have seen the need for preparing internal guidelines to have the knowledge necessary to provide a quality service, and they also need to have their units ready to receive all those patients as soon as possible [2]. However, there are still many aspects of this virus that are unknown, its effects on the human body, its modes of transmission, the primary reproduction number, risk factors for developing severe illness, and the case fatality rate.

As pregnant women have impaired cellular immunity and physiological changes that make them susceptible to respiratory diseases and more prone to develop severe pneumonia, they are considered a special population. The experts are really worried about both the mothers and their babies because, just in the USA, around 12,969 confirmed cases of COVID-19 are pregnant women (until July 23) [3,4] (Graphics 1, 2 and 3).

However, there is minimal data available for the clinical course and management of COVID-19 in pregnancy, hence the importance of performing literature reviews to determine the best management guidelines for both pregnant women and their newborn children. We conducted this review to identify strategies for the obstetric management of women diagnosed with COVID-19 and the best neonatal care for their newborns.

2. REVIEW OF LITERATURE AND RESEARCH METHODS

We conducted a comprehensive literature search using PubMed, ELSEVIER, and CDC web page. The search included the articles published from December 2019 through July 2020. The following search terms: "COVID-19", "pregnancy", "maternal mortality", "maternal morbidity", "complications", "clinical manifestations", "neonatal morbidity", "intrauterine fetal death", "neonatal mortality", and "SARS-CoV-2" were used. The web searchers threw a total of 105 results, and the authors reviewed all of them agreeing on the inclusion or exclusion of articles and determining their relevance to the study.

The defined inclusion criteria were: 1) Original articles and bibliographic reviews written in English or Spanish, 2) Published in any country between December 2019 and July 2020 and, 3) Meta-Analysis, Reviews and Systematic Reviews available in full text. The search ended after manually tracing the relevant references related to the topic of the selected articles.

On the other hand, articles whose content was: 1) Cases and series of clinical cases covering the description of any pathology medical and therapeutic treatment, 2) Articles that are not written in English or Spanish, 3) Articles not available in full text and 4) Articles that compared SARS-CoV-2 disease with other respiratory diseases, were excluded.

A manual, descriptive, and comparative analysis has been performed on the differences and similarities concerning the guidelines and recommendations in the medical care of pregnant women and positive for COVID-19 and their newborns.

3. FINDINGS AND ANALYSIS

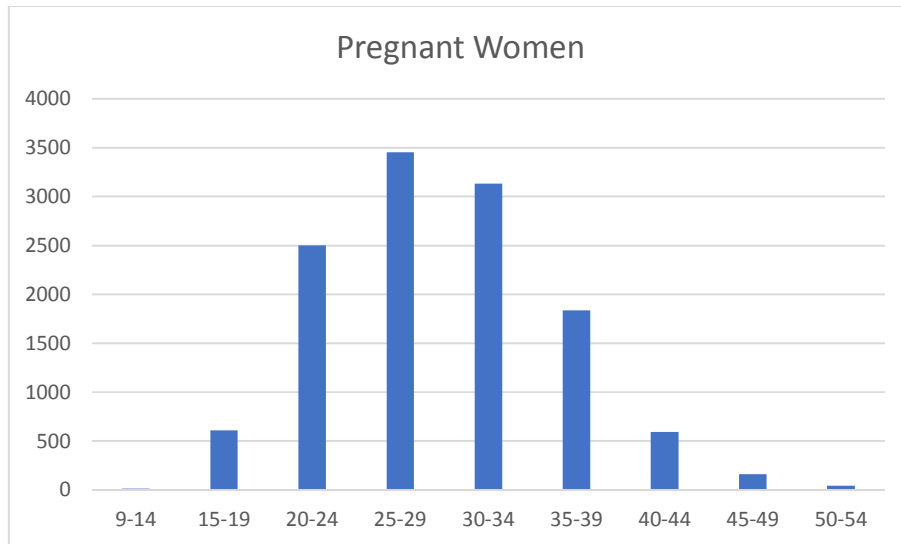
Regarding vertical transmission, several studies concluded that there is no evidence for intrauterine vertical transmission of COVID-19 from infected mothers to their babies. Some

studies even reported that the receptor and protease required for SARS-CoV-2 to infect the cells are not present in cells at the maternal-fetal interface [5,6]. However, other experts say that, although it is infrequent (under 1%), the maternal-fetal transmission is possible [7,8].

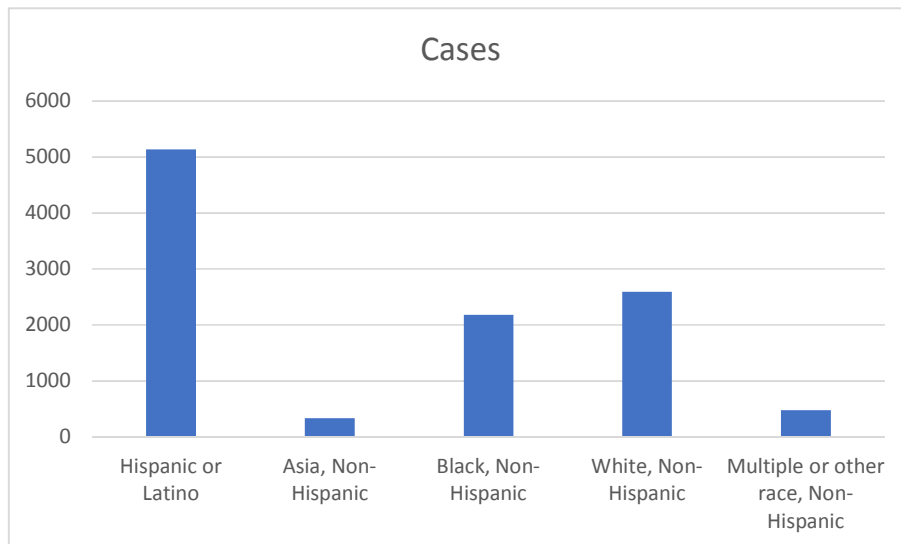
with mild COVID-19, there were other histopathological changes in the placenta, such as maternal vascular poor perfusion and inflammatory changes, which could disrupt the maternal-placental interface and permit the transplacental transmission of SARS-CoV-2 virion [6].

Some of the studies also reported that pregnant women with COVID-19 might develop more severe respiratory complications and in those cases, the virus was isolated in the placenta [5,7]. Likewise, even when women are infected

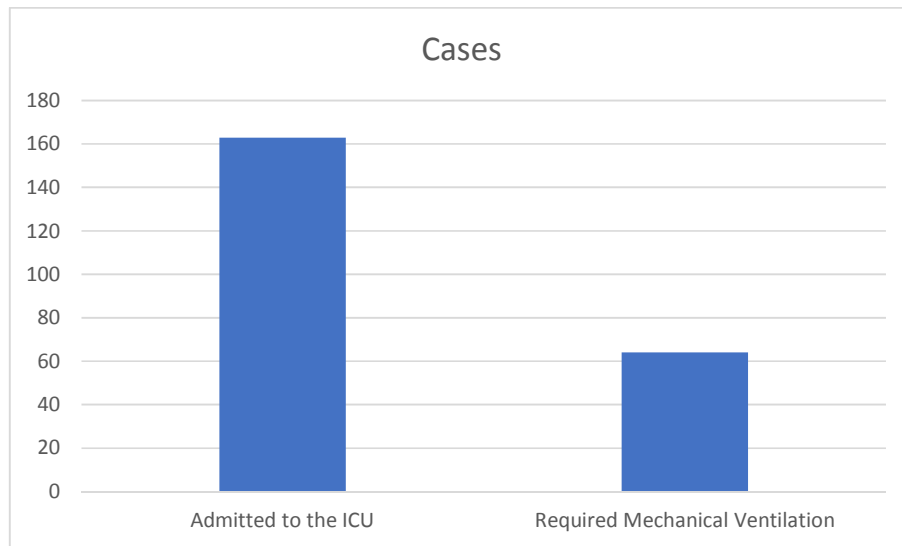
It is also crucial to say that most women included in the current studies got infected at the end of pregnancy, so the time between maternal infection and delivery may not be sufficient for transplacental passage [7].



Graphic 1. Pregnant women with COVID-19 by age, United States, [January 22-July 21, 2020]



Graphic 2. Pregnant women with COVID-19 by race/ethnicity, United States, [January 22-July 21, 2020]



Graphic 3. Pregnant women with COVID-19 admitted to the ICU, or who required mechanical ventilation, United States, [January 22-July 21, 2020]

The available data suggest that COVID-19 disease, even when the pregnant woman has severe symptoms, should not be by itself an indication for Caesarean birth, premature delivery, formula feeding, or isolation of the infant from the mother, but all cases must be individualized [7,9]. According to other authors, operative delivery should be reserved for usual obstetric indications, although it is recommendable in women with severe COVID-19 disease or fetal distress [10,11].

After delivery, women with COVID-19 can transmit the virus to their babies through respiratory droplets during breastfeeding or care. Thus, the experts recommend to those mothers to follow the standard precautions during breastfeeding [5].

Regarding prenatal care, one of the main recommendations is spacing the visits and increasing the telehealth prenatal control if possible; pregnant women should undergo ultrasounds and antenatal surveillance only if doctors indicate them. Some experts even say that low-risk pregnant women infected with COVID-19 mild disease do not need clinical assessment and may follow the standard prenatal care and be safely isolated at home [12]. However, experts recommend frequent telehealth prenatal controls; hence COVID-19 patients may have sudden clinical deterioration [13].

It is imperative that both patients and their caregivers know how to identify severe manifestations of the disease as soon as possible to provide timely treatment, including oxygen support, referral to the intermediate, or intensive care [13].

Another important aspect for obstetricians is that even when preterm delivery was mostly the consequence of elective interventions, a certain tendency toward spontaneous prematurity and fetal distress was noted (12). On the other hand, the available data do not suggest an increased risk of miscarriage or early pregnancy loss in pregnant women with COVID-19. However, there are no studies on the effects of COVID-19 on pregnant women and their fetuses when the infection occurs at the beginning of pregnancy [12,14].

Until the date, some experts ensure that pregnant women do not appear to be more susceptible to COVID-19 infection or to develop severe complications of the disease compared to non-pregnant women. Still, the existing data is minimal, and the presence of comorbidities may increase the risk of developing severe clinical symptoms [13,14]. On the other hand, other authors say that women infected with COVID-19 during pregnancy can develop complications that can affect both her and the fetus, including preterm delivery, respiratory distress, fetal distress, coagulopathy accompanied by liver dysfunction and death of the mother [8].

As COVID-19 is highly contagious, the attending professionals must properly use the personal protective equipment and plan the intrapartum care to prevent the contagion [13]. Both patients and healthcare workers should wear good personal protective equipment (PPE) during all interactions. They should wear N95 masks during aerosol-generating procedures. Another important recommendation is that all institutions must designate an area for screening, labor, and delivery operating rooms only for SARS-CoV-2 infected patients [11].

All pregnant women should report the presence of symptoms, travel history, and contact history. The caregivers will follow the current algorithms to determine the need for performing PCR tests. Likewise, if it is an elective procedure or a scheduled induction of labor, the women should undergo screening and triage over the phone, followed by a visit to a medical center for a nasopharyngeal swab for SARS-CoV-2 infection and get proper medical care after getting the results. In any case, patients with urgent or emergent obstetric conditions must be tested for SARS-CoV-2 right away. Results will not delay the procedures, but those pregnant women should be considered and treated as if they were positive [11].

Using antenatal steroids for fetal lung maturation is still controversial. However, most experts recommend using for patients at high risk of preterm birth if pregnancy is between 24 0/7 to 33 6/7 weeks gestation. Likewise, the patient should stay in the hospital only one day for vaginal delivery and two days for cesarean delivery to limit the time of exposure for patients and healthcare workers [11].

Regarding the use of anesthesia, experts strongly recommend early neuraxial labor analgesia to ensure its availability in the case of requiring an emergency cesarean section during labor. Likewise, the doctor should provide spinal anesthesia if needed. If general anesthesia is necessary and unavoidable, the anesthesiologist must follow the general recommendations as per the guidelines for COVID-19–infected patients regarding patient intubation and extubation [15,16].

As we said before, mother/baby separation is not a universal recommendation. However, neonates from COVID-19-positive women should be tested and cared for with all the hygienic measures to avoid postpartum infection through respiratory

droplets (especially hands hygiene and the caregivers must wear a fluid-resistant surgical face mask). Another alternative is to feed the neonate with pumped or expressed breastmilk via bottle [10]. Likewise, if both the neonate and the mother were positive for coronavirus tests, they should be isolated in different rooms and be screened very carefully [8].

4. DISCUSSION

There is no still a universal consensus of the guidelines or correct ways of proceeding because the COVID-19 infection is very novel. However, most Obstetrical Societies around the world encourage all health institutions to switch to telehealth when appropriate and limit the number of face to face visits. The other guidelines have some differences in the strength of recommendations, and one should adapt them to the specific characteristics of the country, population, and especially to the patient's needs.

5. LIMITATIONS

Some of the limitations founded while performing this bibliographic review were the heterogeneity of some recommendations, the possible presence of publication bias and the fact that many of the studies are in other languages (like Chinese), and we don't have a proper way to read them.

Likewise, this lack of scientific evidence and the limited availability of articles published in this regard, prevent us from knowing the natural history of SARS-CoV-2 infection in pregnant women, the risk of in utero transmission and the possible apparition of short- and long-term side effects on the newborns.

Researchers' difficulty obtaining reliable viral isolation from the placenta and fetal blood/tissues make it difficult to establish the possibility of intrauterine transmission.

6. FUTURE SCOPE

We consider that it is essential to design prospective studies to answer questions like 1) What is the impact of SARS CoV-2 on maternal and pregnancy outcomes? 2) Does it influence the period of infection in pregnancy? 3) How does the severity of the disease and its medical management affect both the mother and the newborn? 4) Have the current medical therapies any significant side effects? 5) What are the

proportions of viral replication? 6) Which is the virus duration in the nasopharyngeal tract, intestine, and maternal blood? 7) What are the risks of mother and child during pregnancy and labor? 8) Is there a difference in the contagious rate of the newborns between vaginal and cesarean delivery? 9) Is it possible the vertical transmission? 10) What are the chances of postnatal infection?

7. CONCLUSIONS

In conclusion, the current information shows that COVID-19 infection apparently is not associated with greater severity of the disease in pregnant women than in the general population. However, the data is minimal, and that represents a challenge for obstetric care providers.

Experts should not underestimate the fetal and maternal risks, and they must be prepared to provide the best quality care to their patients if needed. But, future studies are needed to offer scientific evidence of the short- and long-term maternal and fetal possible complications and to justify the obstetrical interventions.

Similarly, long-term prospective studies are also required in order to determine the real possibility of vertical transmission. Likewise, longitudinal follow-up studies into childhood are needed to establish the full implications of COVID-19 disease infection intrauterine or during birth.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Author has declared that no competing interests exist.

REFERENCES

1. Centers for Disease Control and Prevention. Coronavirus Disease; 2019 (COVID-19), Get the Facts about Coronavirus. Consulted On July 23; 2020. Available: <https://www.cdc.gov/coronavirus/2019-ncov/index.html>
2. Centers for Disease Control and Prevention. Coronavirus Disease; 2019

- (COVID-19), Cases and Deaths in the U.S. Consulted On July 23; 2020. Available: <https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/us-cases-deaths.html>
3. Rupsa C. Boelig, Gabriele Saccone, Federica Bellussi, Vincenzo Berghella. MFM Guidance for COVID-19. American Journal of Obstetrics & Gynecology MFM. Elsevier. 2020;2(2Supplement). Available: <https://doi.org/10.1016/j.ajogmf.2020.100106>
4. Centers for Disease Control and Prevention. Coronavirus Disease; 2019 (COVID-19), Special Populations, Pregnancy Data in the U.S. Consulted On July 23; 2020. Available: <https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/special-populations/pregnancy-data-on-covid-19.html>
5. Karimi-Zarchia M, et al. Vertical transmission of Coronavirus Disease 19 (COVID-19) from infected pregnant mothers to neonates: A review. Taylor & Francis Group. FETAL and Pediatric Pathology; 2020. Available: <https://pubmed.ncbi.nlm.nih.gov/32238084/> DOI: 10.1080/15513815.2020.1747120
6. Mahyuddin AP, et al. Mechanisms and evidence of vertical transmission of infections in pregnancy including SARS-CoV -2. Prenatal Diagnosis; 2020. Available: <https://obgyn.onlinelibrary.wiley.com/doi/abs/10.1002/pd.5765> DOI: 10.1002/pd.5765
7. Charles Egloff, Christelle Vauloup-Fellous, Olivier Picone, Laurent Mandelbrot, Pierre Roques. Evidence and possible mechanisms of rare maternal-fetal transmission of SARS-CoV-2. Journal of Clinical Virology. Elsevier; 2020. Available: <https://pubmed.ncbi.nlm.nih.gov/32425663/> DOI: 10.1016/j.jcv.2020.104447
8. Latif Panahi, Marzieh Amiri, Somaye Pouy. Risks of Novel Coronavirus Disease (COVID-19) in pregnancy; A narrative review. Archives of Academic Emergency Medicine. 2020;8(1):e34. Available: <https://pubmed.ncbi.nlm.nih.gov/32232217/>
9. Kate F. Walker, et al. Maternal transmission of SARS-COV-2 to the neonate and possible routes for such transmission: A systematic review and

- critical analysis. BJOG. An International Journal of Obstetrics and Gynaecology; 2020.
Available: <https://obgyn.onlinelibrary.wiley.com/doi/full/10.1111/1471-0528.16362>
DOI: <https://doi.org/10.1111/1471-0528.16362>
10. Sarah K. Dotters-Katz, Brenna L. Hughes. Considerations for obstetric care during the COVID-19 pandemic. American Journal of Perinatology. 2020;37(8).
Available: <https://www.thieme-connect.com/products/ejournals/pdf/10.1055/s-0040-1710051.pdf>
DOI: <https://doi.org/10.1055/s-0040-1710051>
 11. Kavita Narang, et al. SARS-CoV-2 in pregnancy: A comprehensive summary of current guidelines. Journal of Clinical Medicine; 2020.
Available: <https://www.mdpi.com/2077-0383/9/5/1521/pdf>
DOI: 10.3390/jcm9051521
 12. Anna Nunzia Della Gatta, Roberta Rizzo, Gianluigi Pilu, Giuliana Simonazzi. Coronavirus disease 2019 during pregnancy: A systematic review of reported cases. American Journal of Obstetrics & Gynecology – Elsevier; 2020.
Available: <https://pubmed.ncbi.nlm.nih.gov/32311350/>
DOI: 10.1016/j.ajog.2020.04.013
 13. Marta López, et al. Coronavirus Disease 2019 in pregnancy: A clinical management protocol and considerations for practice. Fetal Diagnosis and Therapy – Karger; 2020.
Available: <https://www.karger.com/Article/FullText/508487>
DOI: 10.1159/000508487
 14. Cabero-Pérez MJ, Gómez-Acebo I, Dierssen-Sotos T, Llorca YJ. Infección por SARS-CoV-2 en el embarazo y posibilidad de transmisión al neonato: una revisión sistemática. Medicina de familia, Semergen; 2020.
Available: <https://www.sciencedirect.com/science/article/pii/S1138359320302033>
DOI: <https://doi.org/10.1016/j.semerg.2020.06.011>
 15. Melissa Bauer, et al. Obstetric anesthesia during the Coronavirus Disease 2019 pandemic. International Anesthesia Research Society. Obstetric Anesthesiology; 2020.
Available: https://journals.lww.com/anesthesia-analgesia/Fulltext/2020/07000/Obstetric_Anesthesia_During_the_COVID_19_Pandemic.4.aspx
DOI: 10.1213/ANE.0000000000004856
 16. Bampoe S, Odor PM, Lucas N. Novel coronavirus SARS-CoV-2 and COVID-19. Practice recommendations for obstetric anaesthesia: What we have learned thus far. International Journal of Obstetric Anesthesia; 2020.
Available: <https://www.sciencedirect.com/science/article/pii/S0959289X20300571>
DOI: <https://doi.org/10.1016/j.ijoa.2020.04.006>

© 2020 Fatima; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/61930>