Corona Virus and Pregnancy Outcomes in Iraqi Population

Dr. Suham Abbas Hassan[1*], Dr. Tagreed H. Hatem[2], Dr. Mysoon Sami[1]
Dr. Abeer Nazhan Noaman[1]

1. M.B.CH.B, C.A.B.O.G-maternal medicine fellowship.

2. MB.ch.B. C.A.B.O.G Consultant in Obstetrics and Gynecology, Baghdad Teaching hospital.

* *Corresponding Author* hassansuham5@gmail.com.

Original Article

Abstract

Background: *COVID-19 is an acute, immunologically mediated, systemic proinflammatory disease with predominantly endothelial involvement. Although the fundamental symptoms of COVID-19 disease are respiratory, there are also neurological, renal, digestive and other organ complications.*

Objective: *To assess pregnancy outcome among COVID-19 infected in Iraqi pregnant women. Patients and*

Patients and methods: *A prospective study that carried out in the Department of Obstetrics and Gynecology/ Baghdad Teaching Hospital in the period from the first of July 2020 to the end of Jun 2021. A sample of 120 pregnant women infected with COVID-19 enrolled in the study (92 a lived patient and 28 dead).*

Results: *The mean age (29.56±4.99) years, more than half of the patients (56.7%) with in the age between (30-39) years, (37.5%) in the age between (20-29) years and only (5.8%) in the age (<20) years. more than half (60.0%) of patients was delivered by vaginal delivery, while (30.8%) by caesarean section, (9.2%) still pregnant. (46.7%) of the patients presented with 1-3 parity, while (40.8%) of the patients was nulliparous, and (12.5%) with parity ≥4. Majorities (95.8%) of the patients with no history of abortion and only (4.2%) with history of abortion between (1-3) times.*

Conclusion: *Preeclampsia was the main complications in the study,(18.3%) neonates admitted to NICU, More than one third of the patients (37.5%) was admitted to ICU, and sever COVID-19 cases was found in (30.8%).*

Keywords: *Corona virus, pregnancy outcomes, Iraqi pregnant women.*

1. INTRODUCTION

The current pandemic due to coronavirus disease 2019 (COVID-19) is the third epidemic acquired by humans from animal coronaviruses in approximately two decades. The three massive infections have been caused by the SARS-CoV (Severe acute respiratory syndrome-related coronavirus) viruses in 2003, MERS-CoV (Middle East respiratory syndrome-related coronavirus) in 2012 and by the recent SARS-CoV-2 (1). According to the World Health Organization (WHO), this new etiological agent, as of today, March 24, 2020, has infected 372,755 people and caused 16,231 deaths, most of them in China (81,747 cases and 3,283 deaths), Italy (63,927 cases with 6,077 deaths), the United States (42,164 cases and 471 deaths), Spain (33,089 cases and 2,182 deaths), Germany (29,212 cases and 126 deaths), and Iran (23,049 cases with 1812 deaths) (2). According to the WHO, for the same date, Peru, with 395 cases and two deaths, is behind Brazil (1,546 cases with 14 deaths), Ecuador (790 and 15 deaths) and Chile (746 cases with 1 death) 2 . This incidence is incompatible with the values reported by the Peruvian Ministry of Health, which reports 480 positive cases with nine deaths nationwide. In this context, fortunately, there is no scientific evidence that indicates greater sensitivity to SARS-CoV-2 on the part of pregnant women and children (3,4). Coronaviruses belong to the family Coronaviridae , subfamily Coronavirinae. They are encapsulated viruses with a diameter between 60-140 nm, they have a long, positive, non-segmented RNA (27.9 kb and 30.1 kb).

They are classified into 4 genera:

Alfacoronavirus,Betacoronavirus,Deltacoronavirus and Gamacoronavirus ; Only some species belonging to the first two have been described as etiological agents of respiratory diseases in humans (adults and children) (5). The observed morphology of SARS-CoV-2 is consistent with that of other coronaviruses (6). It is formed by peplomeres with viral spikes that are related to their tropism. Additionally, coronaviruses present the capsule, membrane and nucleocapsid proteins that constitute their basic structures. Recent studies show that SARS-CoV-2 has optimized sites for binding to human angiotensin-converting enzyme 2 (ACE2) receptors, as well as modified viral spikes in the S sector, specifically, between the S1 and S2 subunits. which could be screened by the furin enzyme and thus increase the infective potential of the virus (7,8).

2. PATIENTS and METHODS

Study design and setting:

A prospective study that carried out in the Department of Obstetrics and Gynecology/ Baghdad Teaching Hospital in the period from the first of July 2020 to the end of Jun 2021. A sample of 120 pregnant women with Singleton pregnancy and viable fetus who were infected with COVID-19 were enrolled in the study (92 a lived patient and 28 dead). Included women

Study protocol and data collection:

Full history taking about (Age, gestational age, parity, past medical history, abortion, gender of baby, status of baby, and type of delivery).

Gestational age was established according to last menstrual period, or with early pregnancy ultrasound when available. The sample was collected in labor ward at Baghdad teaching hospital.

Method:

After the admission of the patient's full physical examination were done for them and vital signs checking (BP, PR, O2 saturation, respiratory rate) and send them for complete investigation (CBC, LFT, RFT, ESR, C-RP, PCR for COVID-19) and keep patients on treatment according to her condition in collaboration with respiratory Physician.

3. RESULTS

There was 120 pregnant ladies infected with COVID-19 and at the time of labor with in the mean age (29.56±4.99) years, more than half of the patients (56.7%) with in the age between (30-39) years, (37.5%) in the age between (20-29) years and only (5.8%) in the age (<20) years. Regarding to the gender of baby; 105 patients was delivers in which male was 63 (61.7%) and female was 46 (38.3%), and from those delivered 106 (88.3%) was alive, 14 (11.7%) was dead. In the current study 87 (72.5%) patients with no past medical history, while 20 (16.7%) presented with hypertension, 4 (3.3%) patients with epilepsy and only 2 (1.7%) of patients with heart failure. All of these findings are demonstrated in (**Table 1**).

More than half (60.0%) of patients was delivered by vaginal delivery, while (30.8%) by caesarean section, (9.2%) still pregnant. Regarding to the parity (46.7%) of the patients presented with 1-3 parity, while (40.8%) of the patients was nulliparous, and (12.5%) with parity ≥4. Majority of the patients (95.8%) with no history of abortion and only (4.2%) with history of abortion between (1-3) times (**Table 2**). There was 92 (76.7%) of the patients were alive and 28 (23.3%) of them were died as shown in (**Figure 1**). Preeclampsia was the main complications in the study (15.8%), then

preterm (11.7%), GDM (6.7%), and asthma was (1.7%) as shown in (**Table 3**). There was 22 (18.3%) neonates admitted to NICU, 5 (4.2%) of them was small for gestational age, neonatal death was presented in 3 (2.5%), and 2 (1.7%) of neonates with Apgar score<7 at five minutes as shown in (**Table 4**). More than one third of the patients (37.5%) was admitted to ICU, and sever COVID-19 cases was found in (30.8%) of them (**Table 5**).

Table 1. Demographic characteristics of the patients in the study group

Variables		No.	%
Age group/years	<20	7	5.8
	20-29	45	37.5
	30-39	68	56.7
	Mean ± SD	29.56 ± 4.99	
Gender of baby	Male	63	61.7
	Female	46	38.3
	Total*	109	100.0
Status of baby	Alive	106	88.3
	Dead	14	11.7
Past medical History	Negative	87	72.5
	Positive	33	27.5
	DM	7	5.8
	Heart failure	2	1.7
	HTN	20	16.7
	Epilepsy	4	3.3

*11 women dead and still pregnant (so the gender of baby was unknown)

Table 2. Obstetrical history of the studied group

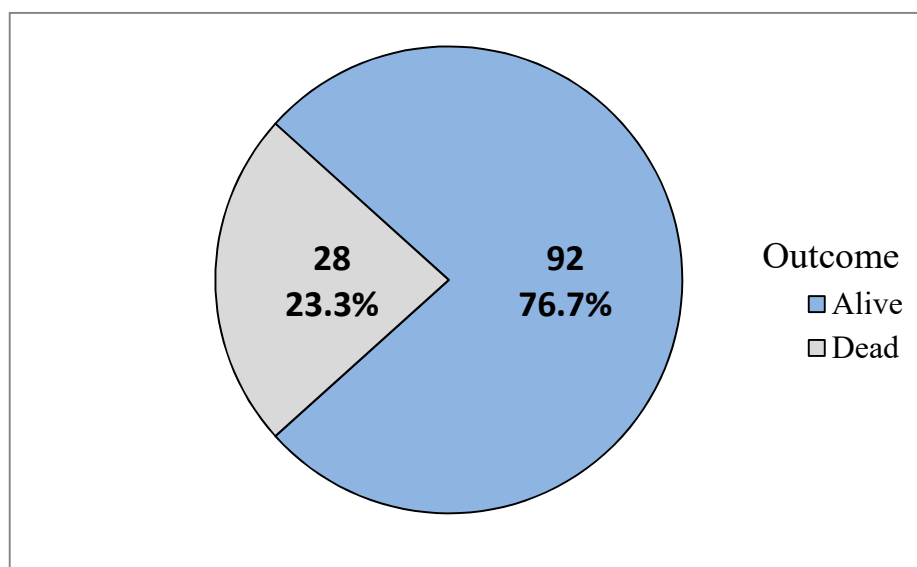| Variables		NO.	%
Type of Delivery	VD	72	60.0
	CS	37	30.8
	Still Pregnant (dead)	11	9.2
Parity	Nulliparous	49	40.8
	1-3	56	46.7
	≥4	15	12.5
Abortion	None	115	95.8
	1-3	5	4.2
Total		120	100.0
Gestational Age/weeks (mean ± SD): 33.99 ± 6.86			

Figure 1. Distribution of the studied group according to the outcomes.

Table 3. Complications of the disease in the studied group

Complications	No.	%
No complications	77	64.1
Preterm	14	11.7
Preeclampsia	19	15.8
GDM	8	6.7
Asthma	2	1.7
Total	120	100.0

Table 4. Outcomes among live born neonates in the studied group

Variables	No.	%
Neonatal death	3	2.5
Small for gestational age	5	4.2
Apgar score <7 at five minutes	2	1.7
Neonate admitted to NICU	22	18.3

NICU: Neonatal intensive care unit (NICU)

Table 5. Maternal COVID-19 severity and outcomes in the studied group

Variables	No.	%
ICU admission	45	37.5
Severe COVID-19 cases	37	30.8
Not sever	38	31.7

4. DISCUSSION

pregnant women are known to experience immunological and physiological changes that may make them more susceptible to viral respiratory infections, including COVID-19. Several studies have revealed that pregnant women with different viral respiratory diseases have a high risk of developing pregnancy complications and adverse perinatal outcomes compared to non-pregnant women, due to changes in the immune response. It is also known that pregnant women may be at risk of severe illness, morbidity, or mortality compared to the general population, as seen in cases of other related coronavirus infections, including severe acute respiratory syndrome (SARS-CoV), Middle East respiratory syndrome (MERS-CoV)] and other viral respiratory infections, such as the flu during pregnancy (9,10).

Demographic characteristics of the patients in the study group

The mean age of the patients in the studied group was (29.56±4.99) years, more than half of the patients (56.7%) with in the age between (30-39) years. Regarding to the gender of baby; male was (61.7%) and female was (38.3%), and from those delivered (88.3%) was alive, and (11.7%) was dead. Which is in agreement with Wilkinson M et al, study that revealed the mean age of the studied group was (30 years) and gender of baby shows that male was more than female (11).

Obstetrical criteria:

Maternal COVID-19 is linked to a higher incidence of caesarean section. A comparative study conducted in Wuhan, China, examined pregnant women who tested positive for COVID-19 and pregnant women who did not have COVID-19. The study found that pregnant women with COVID-19 had a higher likelihood of undergoing a caesarean section, with an odds ratio of 3.34 and a 95% confidence interval ranging from 1.60 - 7.00. Caesarean section is recommended when COVID-19 symptoms, such as maternal dyspnea, are getting worse (12). Conversely, a first retrospective analysis comparing delivery procedures revealed no substantial disparity between pregnant women with and without COVID-19 (13). Overall, research suggests that women with

COVID-19 had greater rates of caesarean section. A comprehensive systematic review revealed an odds ratio of 3 (95% confidence interval: 2-5). According to the research, COVID-19 pneumonia was the reason for recommending a caesarean delivery in 55.9% of cases (14).The rise in caesarean section rates can be attributed to both the direct impact of COVID-19 on maternal health and the increasing occurrence of medical conditions indirectly influenced by COVID-19. For instance, a study conducted in China indicated that an excessive increase in weight during pregnancy, caused by a decrease in physical activity during the pandemic, has resulted in a rise in the number of caesarean sections (15).

Women with COVID-19 may experience a higher incidence of foetal discomfort during labour. A prospective study found no significant association between COVID-19 and preterm premature rupture of the membranes, which is a possible cause for caesarean birth(16). The adjusted relative risk (aRR) was 0.19, with a 95% confidence interval (CI) of 0.02 to 2.20, and a p-value of 0.186. The number is 68. Considering the collective evidence, it appears probable that the main factor contributing to the increased rate of caesarean sections in individuals with COVID-19 is the deterioration of maternal COVID-19 symptoms (17). In the current study more than half (60.0%) of patients was delivered by vaginal delivery, while (30.8%) by caesarean section, (9.2%) still pregnant, which is same that found by Prabhu M et al, study as the overall caesarean section rate was (30.5%) (18). However, it contradicts the findings of a study conducted by Khan M et al, which revealed that Caesarean section was a prevalent method of delivery in 83.9% of pregnant women infected with COVID-19. The increasing rates can be attributed to the declaration of COVID-19 as a global pandemic by the World Health Organisation. In response, countries have been urged to take aggressive measures, which are also reflected in various initiatives. As a result, the recommendation of C-sections has been made to reduce adverse outcomes for both perinatal and neonatal cases (19). Moreover, it is not in agreement with that found in a review carried out by a group of researchers in the United Kingdom, 21 studies were identified, which were case reports or case series. In the reviewed reports, as of March 17, 2020, 32 pregnant women with COVID-19 had been reported, giving birth to 30 newborns (one twin pregnancy and 3 ongoing pregnancies), 7 (22.0%) were asymptomatic and 2 (6.0%) were admitted to the intensive care unit (ICU), one of whom remained on extracorporeal membrane oxygenation. No maternal deaths had been reported. Delivery was by cesarean section (84.3%) cases, and 15 patients (47.0%) delivered prematurely (20).

Mortality rate

In a worldwide study of 2,100 pregnant women, those who contracted COVID-19 during pregnancy were 20 times more likely to die than those who did not contract the virus (21). Mortality rate in pregnant women in the current study was high as it found in 28 (23.3%), which is in agreement with that found by Mendez-Dominguez N et al, mentioned that maternal mortality increased over 60% in 1 year during the pandemic; COVID-19 was linked to 25.4% of maternal deaths in the studied period (22). But it is not in agreement with a systemic review carried by Karimi L et al, in which the mortality rate of COVID-19 in pregnant and postpartum women was only 1.30%. this may be attributed to the high rate of past medical history in the current study (23).

Complication of the disease:

Preeclampsia was the main complications in the present study 15.8%. Which is same that found by Papageorghiou AT et al., as preeclampsia was reported in 16.1% (24). Conde-Agudelo A et al, concluded that SARS-CoV-2 during pregnancy is associated with higher odds of preeclampsia (25). In the current study we found that 11.7% of the COVID-19 pregnant women were preterm labor which is little higher than that reported in nationally reported data prior to the pandemic (10%) (26). While in a study carried by Zgutka K et al revealed that preterm was found in (18.3%) of COVID-19 mothers (27). A study conducted in India by Nayak MK revealed that 55.1% of labour in pregnant women with COVID-19 was attributed to preterm. According to the national neonatal-perinatal database, 40% of neonates in India are born prematurely. The researchers determined that there is an increase in premature births among pregnant individuals who test positive for SARS-CoV-2. This may be attributed to elevated maternal stress levels (28).

Neonatal outcomes

In the present study (18.3%) neonates admitted to NICU, In a study conducted by Nayak MK et al, it was found that 23% of the neonates required neonatal critical care. Sahin D discovered that a mere 2% of individuals were admitted to the Neonatal Intensive Care Unit (NICU). The observed results can be attributed to the somewhat lower age of the participants in the study (29). Current study shows that (4.2%) of neonate was small for gestational age, in agreement with that revealed by Muhidin S et al, and Kasraeian M et al, as the small for gestational age found in between (2.2-17.4%). (30,31). Regarding to the neonatal death it was presented in 3 (2.5%) of the cases, which is little more than that reported previously by many researchers as they mentioned neonatal death was between (0.0-2.4%) (32-36).

5. CONCLUSIONS

Preeclampsia was the main complications in the study,(18.3%) neonates admitted to NICU, More than one third of the patients (37.5%) was admitted to ICU, and sever COVID-19 cases was found in (30.8%).

Ethical Clearance:

Ethical issues were taken from the research ethics committee. Informed consent was obtained from each participant. Data collection was in accordance with the World Medical Association (WMA) declaration of Helsinki for the Ethical Principles for Medical Research Involving Human Subjects, 2013 and all information and privacy of participants were kept confidentially.

Conflict of interest: Authors declared none

Funding: None, self-funded by the authors

6. *REFERENCES*

1. *Sharma A, Tiwari S, Deb MK, Marty JL. Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2): a global pandemic and treatment strategies. International journal of antimicrobial agents. 2020 Aug 1;56(2):106054.*

2. *Sifuentes-Rodríguez E, Palacios-Reyes D. COVID-19: The outbreak caused by a new coronavirus. Boletin Medico del Hospital Infantil de Mexico. 2020 Apr;77(2):47-53.*

3. *Organization World Health. Coronavirus disease 2019 (COVID-19) Situation Report. Genoa: WHO; 2020.*

4. *Lu X, Zhang L, Du H, Zhang J, Li YY, Qu J, et al. SARS-CoV-2: Infection in Children. N Engl J Med. 2020.*

5. *Gizaw B. Corona and Other Virus: Their Useful and Harmful Aspects. Journal of Virology Research & Reports. SRC/JVRR-103. 2020:3.*

6. *Wang S, Guo L, Chen L, Liu W, Cao Y, Zhang J, et al. A case report of neonatal COVID-19 infection in China. Clin Infect Dis. 2020.*

7. *Hussein HA, Hassan RY, Chino M, Febbraio F. Point-of-care diagnostics of COVID-19: From current work to future perspectives. Sensors. 2020 Jul 31;20(15):4289.*

8. *Laurini E, Marson D, Aulic S, Fermeglia A, Pricl S. Computational mutagenesis at the SARS-CoV-2 spike protein/angiotensin-converting enzyme 2 binding interface: comparison with experimental evidence. ACS nano. 2021 Mar 18;15(4):6929-48.*

9. *Wastnedge EA, Reynolds RM, Van Boeckel SR, Stock SJ, Denison FC, Maybin JA, Critchley HO. Pregnancy*

and COVID-19. Physiological reviews. 2021 Jan 1;101(1):303-18.

10. *Zaigham M, Andersson O. Maternal and perinatal outcomes with COVID-19: a systematic review of 108 pregnancies. Acta obstetricia et gynecologica Scandinavica. 2020 Jul;99(7):823-9.*

11. *Wilkinson M, Johnstone ED, Simcox LE, Myers JE. The impact of COVID-19 on pregnancy outcomes in a diverse cohort in England. Scientific reports. 2022 Jan 18;12(1):1-0.*

12. *Yang R, Mei H, Zheng T, Fu Q, Zhang Y, Buka S, et al. Pregnant women with COVID-19 and risk of adverse birth outcomes*

and maternal-fetal vertical transmission: a population-based cohort study in Wuhan, China. BMC Med 2020;18:330.

13. *Zhang L, Jiang Y, Wei M, Cheng BH, Zhou XC, Li J, et al. [Analysis of the pregnancy outcomes in pregnant women with COVID-19 in Hubei Province]. Zhonghua Fu Chan Ke Za Zhi 2020;55:166e71.*

14. *Della Gatta AN, Rizzo R, Pilu G, Simonazzi G. Coronavirus disease 2019 during pregnancy: a systematic review of reported*

cases. Am J Obstet Gynecol 2020;223:36e41.

15. *Zhang J, Zhang Y, Ma Y, Ke Y, Huo S, He L, et al. The associated factors of cesarean section during COVID-19 pandemic: a*

cross-sectional study in nine cities of China. Environ Health Prev Med 2020;25:60.

16. *Pirjani R, Hosseini R, Soori T, Rabiei M, Hosseini L, Abiri A, et al. Maternal and neonatal outcomes in COVID-19 infected pregnancies: a prospective cohort study. J Trav Med 2020;27.*

17. *Dubey P, Reddy SY, Manuel S, Dwivedi AK. Maternal and neonatal c haracteristics and outcomes among COVID-19 infected women: an updated systematic review and meta-analysis. Eur J Obstet Gynecol Reprod Biol 2020; 252:490e501.*

18. *Prabhu M, Cagino K, Matthews KC, Friedlander RL, Glynn SM, Kubiak JM, et al. Pregnancy and postpartum outcomes in a universally tested population for SARS-CoV-2 in New York City: a prospective cohort study. BJOG An Int J Obstet Gynaecol 2020;127:1548e56.*

19. *Khan MM, Khan MN, Mustagir MG, Rana J, Haque MR, Rahman MM. COVID-19 infection during pregnancy: a systematic review to summarize possible symptoms, treatments, and pregnancy outcomes. MedRxiv. 2020 Jan 1.*

20. *Mullins E, Evans D, Viner RM, O´Brien P, Morris E. Coronavirus in pregnancy and delivery: rapid review. Ultrasound Obstet Gynecol. 2020 [citado 20/04/2020]; 55(5): 586-92*

21. *Villar J, Ariff S, Gunier RB, Thiruvengadam R, Rauch S, Kholin A, et al. Maternal and neonatal morbidity and mortality among pregnant women with and without COVID-19 infection: the INTERCOVID*

multinational cohort study. JAMA pediatrics. 2021 Aug 1;175(8):817-26.

22. *Mendez-Dominguez N, Santos-Zaldívar K, Gomez-Carro S, Datta-Banik S, Carrillo G. Maternal mortality during the COVID-19 pandemic in Mexico: a preliminary analysis during the first year. BMC Public Health. 2021 Dec;21(1):1-9.*

23. *Karimi L, Makvandi S, Vahedian-Azimi A, Sathyapalan T, Sahebkar A. Effect of COVID-19 on mortality of pregnant and postpartum women: a systematic review and meta-analysis. Journal of pregnancy. 2021 Mar 5;2021.*

24. *Papageorghiou AT, Deruelle P, Gunier RB, Rauch S, García-May PK, Mhatre M, et al. Preeclampsia and COVID-19: results from the INTERCOVID prospective longitudinal study. American Journal of Obstetrics and Gynecology. 2021 Sep 1;225(3):289-e1.*

25. *Conde-Agudelo A, Romero R. SARS-COV-2 infection during pregnancy and risk of preeclampsia: a systematic review and meta-analysis. American journal of obstetrics and gynecology. 2021 Jul 21.*

26. *Martin, JA, Hamilton, BE, Osterman, MJK. Births in the United States, 2018. NCHS Data Brief 2019:1–8.*

27. *Zgutka K, Prasanth K, Pinero-Bernardo S, Lew LQ, Cervellione K, Rahman L, et al. Infant outcomes and maternal COVID-19 status at delivery. Journal of Perinatal Medicine. 2021 Jul 1;49(6):691-6.*

28. *Nayak MK, Panda SK, Panda SS, Rath S, Ghosh A, Mohakud NK. Neonatal outcomes of pregnant women with COVID-19 in a developing country setup. Pediatrics & Neonatology. 2021 Sep 1;62(5):499-505.*

29. *Sahin D, Tanacan A, Erol SA, Yucel Yetiskin FD, Besimoglu B, Ozden Tokalioglu E, Anuk AT, Turgut E, Goncu Ayhan S, Turgay B, Unlu S. Management of pregnant women with COVID-19: A tertiary pandemic center experience on 1416 cases. Journal of Medical Virology. 2022 Mar;94(3):1074-84.*

30. *Muhidin S, Behboodi Moghadam Z, Vizheh M. Analysis of Maternal Coronavirus Infections and Neonates Born to Mothers with 2019-nCoV; a Systematic Review. Arch Acad Emerg Med. 2020;8(1):e49.*

31. *Kasraeian M, Zare M, Vafaei H, et al. COVID-19 pneumonia and pregnancy; a systematic review and meta-analysis. J Matern Fetal Neonatal Med. 2020 May 19:1-8.*

32. *Matar R, Alrahmani L, Monzer N, et al. Clinical Presentation and Outcomes of Pregnant Women With Coronavirus Disease 2019: A Systematic Review and Meta-analysis. Clin Infect Dis. 2021 Feb 1;72(3):521-33.*

33. *Oltean I, Tran J, Lawrence S, et al. Impact of SARS-CoV-2 on the clinical outcomes and placental pathology of pregnant women and their infants: A systematic review. Heliyon. 2021 Mar;7(3):e06393.*

34. *Della Gatta AN, Rizzo R, Pilu G, et al. Coronavirus disease 2019 during pregnancy: a systematic review*

of reported cases. Am J Obstet Gynecol. 2020 Jul;223(1):36-41.

35. Juan J, Gil MM, Rong Z, et al. Effect of coronavirus disease 2019 (COVID-19) on maternal, perinatal and neonatal outcome: systematic review. Ultrasound Obstet Gynecol. 2020 Jul;56(1):15-27.

36. Zaigham M, Andersson O. Maternal and perinatal outcomes with COVID-19: A systematic review of 108 pregnancies. Acta Obstet Gynecol Scand. 2020 Jul;99(7):823-9.