

Study of Maternal and Fetal Outcome in COVID-19 Positive Pregnant Women in Anugrah Narayan Magadh Medical College and Hospital GayaRanjana Kumari¹, Nilam Bharti², Lata Shukla Dwivedy³¹Assistant Professor, Department of Obstetrics and Gynecology, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India²Assistant Professor, Department of Obstetrics and Gynecology, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India³Professor and HOD, Department of Obstetrics and Gynecology, Anugrah Narayan Magadh Medical College and Hospital, Gaya, Bihar, India

Received: 05-07-2023 Revised: 11-08-2023 / Accepted: 10-09-2023

Corresponding author: Dr. Nilam Bharti

Conflict of interest: Nil

Abstract**Aim:** The aim of the present study was to evaluate maternal and neonatal outcome among COVID-19-positive pregnant women and the effect of disease on pregnancy.**Material & Methods:** A retrospective observational study was carried out at Department of Obstetrics and Gynecology, Anugrah Narayan Magadh Medical College and Hospital, Gaya from March 2020 – December 2020. A total of 17 COVID-19-positive pregnant patients admitted in the corona ward were recruited in the study.**Results:** Study population consisted of 11 (64.71%) women from 20-25 years, 4 (23.53%) women from 26-30 years and 2 (11.76%) women from above 30 years. There was history of exposure among all (100%) pregnant women with only 4 (23.53%) having symptoms of COVID-19. The indications of LSCS were, 2 cases had previous 1 LSCS, 1 previous 2 LSCS, 2 were IUGR, 1 case of Fetal distress & Post-dated, 1 patient with obstructed labour, transverse lie and CPD each. As per gestational age, 5 (29.42%) women had pre-term delivery, 10 (58.83%) had normal-term delivery and 2 (6.45%) had post-term delivery. 7 women were primigravida and 10 were multigravida. The mode of delivery was LSCS among 9 (52.9%) and normal delivery among 8 (47.05%) women. Out of 17 patients, 5 patients were severely anaemic and 3 had Preeclampsia. 1 Patient died in 3rd Post-Operative day in level 3 Covid Ward due to Respiratory Failure.**Conclusion:** Most of the pregnant women infected with Covid-19 showed mild symptoms. Minimum three Antenatal check-up, Rapid intervention, treatment and intensive care support are essential for better outcome.**Keywords:** COVID- 19, Maternal, Neonatal, Preterm Delivery, Pneumonia.This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

The outbreak of SARS-CoV-2 infection has become a global epidemic threat since the end of 2019. [1,2] Coronavirus disease 2019 (COVID-19) is caused by severe acute respiratory syndrome coronavirus 2 (SARSCoV-2). [3] The current pneumonia outbreak of COVID-19 was declared a pandemic by the World Health Organization (WHO) on March 11, 2020. [4] Coronaviruses are family of viruses that can cause a wide range of illnesses, from the common cold to acute respiratory symptoms, and can cause death due to pneumonia and respiratory problems. [5] With the spread of the coronavirus, the incidence of pregnancy in mothers is also increasing. [6]

The COVID-19 strain of corona virus infection has a high rate of transmission by respiratory droplet

and through fomites. [7] The major cause for death during the pregnancy across the world is Viral pneumonia. [8] During pregnancy, there are certain physiological changes like decrease in the functional residual volumes, rise of the diaphragm, respiratory tract mucosa having oedema, along with cell immunity modifications which causes the susceptibility for more chances for viral infections leading to the worst possible outcomes. [9] Most commonly reported infections during the pregnancy is viral pneumonia, and linked to the maternal and neonatal morbidity and mortality. [10] Pregnancy predisposes to immunological adaptations to withstand the fetal semi allograft, and this state of the suppressed T-cell activity makes pregnant women vulnerable to viral infections including COVID-19, and in addition to

this, various respiratory and circulatory physiological changes occurring during pregnancy further makes them liable to catch viral infections during pregnancy.

Studies during the 2009 H1N1 influenza pandemic concluded that pregnancy with H1N1 is a high-risk condition which carries higher risk of severe pneumonia, acute respiratory distress syndrome (ARDS), mechanical ventilation, and death when compared with reproductive-aged nonpregnant women. This was in accordance with few studies on the severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) epidemics, where pregnant patients were more likely to develop organ dysfunction and die. [11] Also, there are more chances of transmission from mother to fetus which might lead to the higher possibility of the infections among fetuses and neonates. [12] Prevention and control of the disease in pregnant women and the potential risk of vertical transmission have become a significant concern. ¹² Despite the large and rapidly rising number of cases of coronavirus disease 2019 (COVID-19) and resulting deaths, there are limited data about the clinical characteristics of pregnant women with the disease.

Hence the aim of the study was to evaluate maternal and neonatal outcome among COVID-19 pregnant women and to evaluate the effect of disease on pregnancy.

Material & Methods

A retrospective observational study was carried out at Anugrah Narayan Magadh Medical College and Hospital, Gaya from March 2020 – December 2020. A total of 17 COVID 19 positive pregnant patients admitted in the corona ward were recruited in the study.

Inclusion Criteria

- COVID-19 test should be positive, pregnant mother and obstetrical indications for admission were included in the study.

Methodology

After obtaining informed consent, cases were subjected to detailed history and physical examination. and routine and appropriate investigations were done for all patients. All necessary antenatal investigations and COVID-19-specific investigations, including complete blood

count (CBC), C-reactive protein (CRP), liver function test (LFT), kidney function test (KFT), D-dimer, and chest X-ray posteroanterior (PA) view with abdominal shield were done on admission.

Maternal symptoms due to COVID-19 infection, comorbidities, number of admissions to the intensive care unit (ICU), and maternal mortality were noted. Perinatal outcomes were noted in the form of intrauterine growth retardation (IUGR), mode of delivery, preterm deliveries, birth weight of newborns, neonatal intensive care unit (NICU) admissions, and neonatal mortality.

COVID-19 reverse transcriptase-polymerase chain reaction (RT-PCR) test was performed on swabs obtained from the nasopharynx for all newborns on the day of delivery and repeated on the seventh day of life. All newborns were allowed to breastfeed following preventive measures for COVID-19. Neonates were kept separately and given to mothers only during breastfeeding. Instructions were given to mothers regarding wearing a face mask to cover their nose and mouth during breastfeeding and hand hygiene (hand wash/sanitization) every time before breastfeeding. COVID-19-infected pregnant women were managed according to the Government of India guidelines. On the 10th day of admission, the SARS-CoV-2 RT-PCR test was performed on a swab from the nasopharynx of women again. Detection of COVID-19 was done by RT-PCR from a center authorized by the Government of India and state governments. We followed these pregnant women after discharge from the hospital till delivery and their maternal and fetal outcomes were noted

The parameters which were measured were status of covid, severity of covid disease, symptoms suggestive of covid, age, parity, gestational age, blood investigations, x-ray, mother's condition, mode of delivery, Apgar score, neonatal infection status, postdelivery complication.

Statistical Analysis

The data was entered into the Microsoft excel and the statistical analysis was performed by statistical software SPSS version 21.0. The quantitative (numerical variables) were present in the form of mean and SD and the qualitative (categorical variables) were present in the form of frequency and percentage.

Results

Table 1: Age wise distribution of the study population

Age (Years)	N (%)
20-25	11 (64.71)
26-30	4 (23.53)
>30	2 (11.76)

Study population consisted of 11 (64.71%) women from 20-25 years, 4 (23.53%) women from 26-30 years and 4 (11.76%) women from above 30 years.

Table 2: Patients showing history of exposure and COVID symptoms.

Variables	N (%)
History of exposure	
Exposure	17 (100)
No exposure	0 (0)
COVID symptoms	
Yes	4 (23.53)
No	13 (76.47)

There was history of exposure among all (100%) pregnant women with only 4 (23.53%) having symptoms of COVID-19.

Table 3: Distribution according to indications of LSCS (n=9)

Indication	N (%)
Previous 1 LSCS	2 (22.22)
Previous 2 LSCS	1 (11.11)
IUGR	2 (22.22)
Fetal distress & Post-dated	1 (11.11)
Obstructed labour	1 (11.11)
Transverse lie	1 (11.11)
CPD	1 (11.11)

The indications of LSCS were, 2 cases had previous 1 LSCS, 1 previous 2 LSCS, 2 were IUGR, 1 case of Fetal distress & Post-dated, 1 patient with obstructed labour, transverse lie and CPD each.

Table 4: Distribution according to the gestational age

Gestational age (Weeks)	N (%)
<37	5 (29.42)
37-40	10 (58.83)
>40	2 (6.45)

As per gestational age, 5 (29.42%) women had pre-term delivery, 10 (58.83%) had normal term delivery and 2 (6.45%) had post-term delivery.

Table 5: Distribution according to the gravidity

Gravid	N (%)
G1	7 (41.17)
G2-G3	5 (29.42)
G4-G5	3 (17.64)
>G5	2 (6.45)

7 women were Primigravida and 10 were Multigravida.

Table 6: Distribution according to mode of the delivery

Mode	N (%)
Vaginal delivery	8 (47.05)
LSCS	9 (52.94)

The mode of delivery was LSCS among 9 (52.94) and normal delivery among 8 (47.05) women.

Table 7: Neonatal outcomes of study participants

	Number of neonates	Percentage (%)
Outcome of delivery		
Intrauterine fetal demise	3	17.64
Live birth	14	82.35
Birth weight (kg)		
1.5-1.9	0	0
<2	1	7.14
2-2.5	8	57.14
>2.5	5	35.71

APGAR Score (at five minutes)		
7-10	13	92.85
4-6	1	7.14
<3	0	0
Neonatal complications		
Neonatal intensive care unit admission	1	7.14
Neonatal death	0	0
COVID-19 positive	1	7.14

There was 14 (82.35%) live birth, and 3 (17.64%) foetal death was reported during the study. The maximum number of neonates (57.14%) had a birth weight of around 2-2.5 kg while 5 (35.71%) neonates had a birth weight of more than 2.5 kg and 1 (7.14%) newborn had a low birth weight of around less than 2.0 kg. 1 (7.14%) newborn had low five-minute APGAR scores (4-6) while 13 (92.85%) newborns had an APGAR score of 7-10. Out of the total 14 live births only one (7.14%) newborn was COVID-19-positive and 1 (7.14%) newborn was admitted to the NICU.

Discussion

Coronavirus disease 2019 (COVID-19) is caused by severe acute respiratory syndrome coronavirus 2 (SARSCoV-2) [1]. Cases of novel coronavirus-associated pneumonia were first reported in Wuhan City, China, in December 2019. [14] The current pneumonia outbreak of COVID-19 was declared a pandemic by the World Health Organization (WHO) on March 11, 2020. [15] The second wave came in mid-March of 2021, and the highest number of cases (144,829) was identified in India on April 9, 2021. [16] Pregnant patients and newborns may be more susceptible to COVID-19 because of the physiologic changes that occur during pregnancy including cardiorespiratory and immune system changes, which may lead to altered response to SARS-CoV-2 infection during pregnancy. [17] As reported in many studies, the clinical course of COVID-19 pneumonia in pregnancy is similar to that in non-pregnant women, but the risk of adverse maternal and perinatal outcomes is not very clear in COVID-19-positive pregnant women. It has been hypothesized in some studies that upregulation of angiotensin-converting enzyme-2 (ACE-2) receptors in human gestation may actually be clinically protective but more studies are needed to confirm this hypothesis. Transmission of infection from the mother to the fetus like other viral diseases including human immunodeficiency virus (HIV), Zika virus, cytomegalovirus (CMV), etc., during antenatal, intrapartum, or postnatal at the time of breastfeeding can occur. Conflicting data exist regarding the vertical transmission of the virus. [18]

Study population consisted of 11 (64.71%) women from 20-25 years, 4 (23.53%) women from 26-30

years and 4 (11.76%) women from above 30 years. There was history of exposure among all (100%) pregnant women with only 4 (23.53%) having symptoms of COVID-19. The indications of LSCS were, 2 cases had previous 1 LSCS, 1 previous 2 LSCS, 2 were IUGR, 1 case of Foetal distress & Post-dated, 1 patient with obstructed labour, transverse lie and CPD each. 7 women were primigravida and 10 were multigravida. There were post-op LSCS/obstetric complications in 1 case in which patient died on Day 3 of LSCS in Covid Ward Level-3 due to respiratory failure. Pregnant women undergo various physiological changes, that can lead to altered immunity. [19] But, this does not necessarily make them more susceptible to viral infection; hence, their response to COVID-19 may be similar to any other viral infection. However, due to the modulated immune system, they may experience severe symptoms, albeit there is a low probability of this happening. According to one study, pregnancy itself does not worsen the symptoms experienced, nor the findings on a CT scan of COVID-19 related pneumonia. Khan et al reported that SARS-CoV-2 infection may lead to the occurrence of neonatal pneumonia and preterm delivery. The possibility that these complications can be linked to other biological processes or intrauterine infections. The focus of this study was to investigate the vertical transmission potential of SARS-CoV-2 infection. Two of the neonates had suspected COVID-19, indicating the possibility for vertical transmission, but there was find no convincing evidence to confirm the vertical transmission potential of SARS-CoV-2. [20]

In our study, 5 women had severe anaemia and 3 had mild-moderate preeclampsia.

As per gestational age, 5 (29.42%) women had pre-term delivery, 10 (58.83%) had normal term delivery and 2 (6.45%) had post-term delivery. A systematic review of 33 studies subsequently described the out-comes of 385 pregnant women with COVID-19 with gestational age at birth ranging from 30 to 41 weeks gestation and a preterm birth rate of 15.2%. [21] The mode of delivery was LSCS among 9 (52.94%) and vaginal delivery among 8 (47.05%) women. Muhidinetal reported that the preferred mode of delivery was caesarean section and only five women (6%) delivered vaginally; none of whose neonates was infected with COVID-19. [22] Intrapartum

transmission was the main concern for choosing cesarean section. Since there is limited evidence about vertical transmission and vaginal shedding of virus, vaginal delivery in stable patients may be considered. In cases of caesarean section, the choice of anaesthesia needs careful consideration. [23] Favre et al suggested that for every individual patient, vaginal delivery even by induction should be considered. Using instrumental delivery also is preferred to caesarean section to avoid unnecessary surgical complications and maternal exhaustion. [24]

There was 82.35% live birth, and three intrauterine foetal death was reported during the study. The maximum number of neonates 8 (57.14%) had a birth weight of around 2-2.5 kg while 5 (35.71%) neonates had a birth weight of more than 2.5 kg and 1 (7.14%) newborn had a low birth weight of less than 2.0 kg. 1 (7.14%) newborn had low five-minute APGAR scores (4-6) while 13 (92.85%) newborns had an APGAR score of 7-10. Out of the total 14 live births only one (7.14%) newborn was COVID-19-positive and 1 (7.14%) newborn was admitted to the NICU.

Conclusion

The available data revealed that clinical manifestations of pregnant women in late pregnancy are very similar to those of non-pregnant adults. In our study, there were few maternal and fetal complications among pregnant women with COVID-19. These may be due to inadequate antenatal checkup during COVID-19 Pandemic. Overall, due to the lack of information on COVID-19 pneumonia in pregnancy, all suspected pregnant women should be systematically screened, monitored and followed up. Another issue is whether natural vaginal delivery increases the likelihood of vertical transmission of the infection and if so, the possible mechanisms need to be clarified. Further investigations and follow-up studies of pregnant mothers infected by COVID-19 are warranted. At least 3 antenatal checkup, rapid intervention treatment and intensive care supports are essential.

References

- Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, Qiu Y, Wang J, Liu Y, Wei Y, Yu T. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *The lancet*. 2020 Feb 15;395(10223):507-13.
- Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, Zhang L, Fan G, Xu J, Gu X, Cheng Z. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The lancet*. 2020 Feb 15;395(10223):497-506.
- Zhou M, Zhang X, Qu J. Coronavirus disease 2019 (COVID-19): a clinical update. *Frontiers of medicine*. 2020 Apr; 14:126-35.
- WHO Director-General's opening remarks at the media briefing on COVID-19. (2020). Accessed: March 12, 2020: <https://www.who.int/dg/speeches/detail/who-director-general-s-openingremarks-at-the-mediabriefing-on-Covid-19—11-m...>
- Lam CM, Wong SF, Leung TN, Chow KM, Yu WC, Wong TY, Lai ST, Ho LC. A case-controlled study comparing clinical course and outcomes of pregnant and non-pregnant women with severe acute respiratory syndrome. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2004 Aug;111(8): 771-4.
- Liu Y, Chen H, Tang K, Guo Y. Clinical manifestations and outcome of SARS-CoV-2 infection during pregnancy. *J infect*. 2020 Mar 4; 10:30109-2.
- China CD. Weekly (2020). Vital surveillance: The epidemiological characteristics of an outbreak of. 2019:113-22.
- Wu Y, Guo C, Tang L, Hong Z, Zhou J, Dong X, Yin H, Xiao Q, Tang Y, Qu X, Kuang L. Prolonged presence of SARS-CoV-2 viral RNA in faecal samples. *The lancet Gastroenterology & hepatology*. 2020 May 1;5 (5):434-5.
- Dashraath P, Wong JL, Lim MX, Lim LM, Li S, Biswas A, Choolani M, Mattar C, Su LL. Coronavirus disease 2019 (COVID-19) pandemic and pregnancy. *American journal of obstetrics and gynecology*. 2020 Jun 1;222(6): 521-31.
- Liu W, Wang Q, Zhang Q, Chen L, Chen J, Zhang B, Lu Y, Wang S, Xia L, Huang L, Wang K. Coronavirus disease 2019 (COVID-19) during pregnancy: a case series.
- Qiancheng X, Jian S, Lingling P, Lei H, Xiaogan J, Weihua L, Gang Y, Shirong L, Zhen W, GuoPing X, Lei Z. Coronavirus disease 2019 in pregnancy. *International journal of infectious diseases*. 2020 Jun 1;95: 376-83.
- Khan S, Siddique R, Ali A, Xue M, Nabi G. Novel coronavirus, poor quarantine, and the risk of pandemic. *Journal of Hospital Infection*. 2020 Apr 1;104(4):449-50.
- Zhang L, Jiang Y, Wei M, Cheng B, Zhou X, Li J et al (2020) Analysis of the pregnancy outcomes in pregnant women with COVID-19 in Hubei Province. *Zhonghua fu chan ke za zhi* 55:E009-E
- Zhou M, Zhang X, Qu J. Coronavirus disease 2019 (COVID-19): a clinical update. *Frontiers of medicine*. 2020 Apr; 14:126-35.
- WHO Director-General's opening remarks at the media briefing on COVID-19. (2020).

16. Kar SK, Ransing R, Arafat SY, Menon V. Second wave of COVID-19 pandemic in India: Barriers to effective governmental response. *EClinicalMedicine*. 2021 Jun 1;36.
17. Wastnedge EA, Reynolds RM, Van Boeckel SR, Stock SJ, Denison FC, Maybin JA, Critchley HO. Pregnancy and COVID-19. *Physiological reviews*. 2020 Nov 20.
18. Mazur-Bialy AI, Kołomańska-Bogucka D, Tim S, Oplawski M. Pregnancy and childbirth in the COVID-19 era—the course of disease and maternal–fetal transmission. *Journal of Clinical Medicine*. 2020 Nov 21;9(11):3749.
19. Liu H, Liu F, Li J, Zhang T, Wang D, Lan W. Clinical and CT imaging features of the COVID-19 pneumonia: focus on pregnant women and children. *J Infect*. 2020;80(5):e7-13.
20. Khan S, Jun L, Siddique R, Li Y, Han G, Xue M, Nabi G, Liu J. Association of COVID-19 with pregnancy outcomes in health-care workers and general women. *Clinical microbiology and infection*. 2020 Jun 1;26(6):788-90.
21. Elshafeey F, Magdi R, Hindi N, Elshebiny M, Farrag N, Mahdy S, Sabbour M, Gebril S, Nasser M, Kamel M, Amir A. A systematic scoping review of COVID-19 during pregnancy and childbirth. *International Journal of Gynecology & Obstetrics*. 2020 Jul;150(1):47-52.
22. Muhidin S, BehboodiMoghadam 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.
23. Liang H, Acharya G. Novel corona virus disease (COVID-19) in pregnancy: What clinical recommendations to follow? *Acta Obstet Gynecol Scand*. 2020 Apr;99(4):439-42.
24. Favre G, Pomar L, Qi X, Nielsen-Saines K, Musso D, Baud D. Guidelines for pregnant women with suspected SARSCoV-2 infection. *Lancet Infect Dis*. 2020; S1473-3099(20)30157-2.