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Research Article

Analysis of Pregnant Women, their Newborn Infants, and Maternal-Fetal Transmission of COVID-19 admitted in Tertiary Hospital, Patiala, Punjab

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Abstract

Aims and Objectives: The aim of the study was to find the clinical characteristics of pregnant women, their newborn infants, and maternal-fetal transmission of coronavirus disease 2019 (COVID-19).

Materials and Methods: Study design was cross-sectional design. The setting included all the mothers admitted in labor room and their infants in the month of July-August 2020 in Government Rajindra Hospital, Patiala. The study sample included total 574 (July in 282 and 292 in August) pregnant mothers (60 COVID-19 positive mothers) and their infants admitted during the month of July-August 2020. Mothers and neonatal data were collected from mother's record and child files from neonatal intensive care unit.

Results: A total of 60 infected antenatal mothers with COVID were reported. Confirmation by reverse transcription polymerase chain reaction test shows that throat swab for two newborns were positive for COVID-19.

Conclusion: The risk of vertical transmission is small. Majority of the newborns remain asymptomatic with good clinical outcome. The findings from this study can guide and enhance prenatal counseling of women with COVID-19 infection occurring during pregnancy.

Keywords: Coronavirus disease 2019, pregnant women and neonate, vertical transmission

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Introduction

In December, the first case of pneumonia of unknown origin emerged in Wuhan, the capital of China's Hubei province. On December 31, 2019, Wuhan attracted the attention of the World Health Organization (WHO) due to such cases.[1] The identified virus has been named novel coronavirus 2019, an enveloped single-stranded RNA virus,[2] currently known as severe acute respiratory syndrome coronavirus-2 (SARS-

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CoV-2), phylogenetic similarity to SARS-COV-1.[3] As the deadly disease rapidly spread from the epidemic to many countries, the WHO declared the disease Public Health Emergency of International Concern on January 30, 2020.[4,5] While the affected countries, the number of patients and the number of deaths and injuries continue to increase, the WHO announced on March 11, 2020, that the coronavirus disease 2019 (COVID-19) is a global pandemic and the incubation period of the disease with direct contact is 4–14 days.[6] The main symptoms of COVID-19 are fever, dry cough, shortness of breath, myalgia, fatigue, decreased blood flow, and signs of pneumonia. Injury, secondary infection, and acute kidney injury and in severe cases, death.[7] At present, the use of preventive measures to control COVID-19 is an important intervention. Maternal pneumonia is associated with a variety of adverse outcomes including preterm and premature labor, fetal death, fetal growth restriction, and neonatal death.[8]

India ranked second most populated country in the world with a fertility rate of 2.179 births per woman.[9,10] Around 25 million babies are born in India each year, accounting for one- fifth of the world's annual births and ranking first worldwide.[11] The 2019 COVID outbreak is the third outbreak in the group of coronaviruses, after the 2002 severe acute respiratory syndrome (SARS) coronavirus outbreak and the 2012 Middle East respiratory syndrome coronavirus outbreak.[12-14] Both infections cause serious illness and death in pregnant women and their babies.[15,16] As a result of the outbreak of COVID in India, the lives of pregnant women are facing new challenges. They also face a high risk of direct health and mental illnesses arising from the COVID-19 virus both directly or indirectly, as COVID-19 appears to have a similar capability as SARS-CoV and MERS-CoV.

Since the WHO declared the COVID-19 epidemic on March 11, 2020, India has been one of the worst-hit countries by the epidemic, second in the world with 27,547,705 people.[17] In addition, pregnant women have a higher incidence of COVID-19 cases and deaths compared to non-pregnant women. New report from the U.S. Centers for Disease Control and Prevention (CDC) reports that antenatal women are more susceptible to serious illness and therefore at higher risk of intensive care unit admission and ventilator placement because they are in an immune system that makes them vulnerable to breathing problems.[18] Patients may be more susceptible to rapid treatment against COVID-19 during pregnancy, as lung capacity decreases due to the size of the uterus, which may lead to a risk of poor pregnancy.[19,20] The risk of maternal death is 22 times higher than in pregnant women who are not infected with COVID-19.[21]

There are currently no reports of serious adverse effects on newborns. Although the overall prevalence is reported to be very low, there are many studies that contradict each other regarding in uterus maternal-fetal transmission of COVID-19 from antenatal women to their babies.[22,23] In addition, there is no clear evidence that the disease can be transmitted through breast milk. Recommendations for breastfeeding have not changed as most studies have not found the presence of bacteria in breast milk, but there are bacteria that appear in breast milk.[24,25] It is clear from the CDC report that there was no difference in infection risk between newborns living in separate rooms with their mothers and their caregivers.[26] The risk of infection is low, so the mother is at risk of passing the disease to her newborn unless she takes appropriate precautions. Under these circumstances, children born to COVID-19-positive mothers must face special challenges during the current pandemic. Because coronaviruses have not been previously reported in humans, there have been some reports of adverse pregnancy outcomes in pregnant women infected with COVID-19. Pregnant women are more susceptible to respiratory diseases; therefore, they may be more exposed to COVID-19 than the general public. In addition, characteristic immune responses from the pregnancy and potential risk from the cytokine storm by pregnant women with COVID-19 infection may face severe morbidity and even mortality. Although the evidence does not support vertical transmission *in utero*, infection and inflammation in the mother in response to COVID-19 can affect the fetus and even occur after birth. As the spread of COVID-19 continues, more efforts are needed to protect mothers and unborn babies. More research is needed to investigate pregnant women with COVID-19 in the first 2 months of pregnancy and determine pregnancy outcome and fetal development after birth.

Objectives of the study

1. To find the clinical details of mothers infected with COVID-19
2. To detect the possibility of vertical transmission of COVID-19 from mothers to their newborn
3. To find the clinical details of newborn infected with COVID-19.

Materials and Methods

Study design

Cross-sectional study.

Study setting

The study included all pregnant women admitted in labor room and their newborn in month of July-August 2020 in Government Rajindra Hospital, Patiala.

Target population

COVID-positive mothers and their newborn.

Sampling technique

Purposive sampling technique.

Sample size

The study sample included total l74 mothers (60 COVID positive and their infants admitted during the month of July-August 2020).

Data collection technique

Neonatal data were collected from mother's record from labor room and child files from neonatal intensive care unit. In addition, data were collected from collection forms and medical record.

Research tool

Research tool used for the study was as follows:

1. Clinical profile sheet for mother which includes age, mode of delivery, gestational age, pregnancy outcome, and maternal reverse transcription polymerase chain reaction (RT-PCR)
2. Clinical profile sheet for infants which include gender, weight, neonatal outcome, and neonatal RT-PCR.

Statistics

Descriptive and inferential statistics were used to analyze the data.

Inclusion and exclusion criteria

Inclusion criteria

- Mothers infected by COVID-19 confirmed by RT-PCR
- Newborns delivered by COVID-19-infected mother
- Mother infected by COVID-19 and admitted in hospital
- Mother who are infected by COVID-19 but willing to participate.

Exclusion criteria

- Mothers who are infected by COVID-19 confirmed by COVID test kit
- Newborns delivered by COVID-19 mother and who are not present at sampling time.

Ethical permission

Ethical permission was taken from the head of the department to conduct the study confidentiality of the data maintained throughout the study.

Results

Table 1 depicts that overall age of pregnant mothers lies between 24 and 34 years. 34 out of 60 pregnant women underwent C-sections however 26 of them had normal delivery. Majority of pregnant women had gestational age 38–40 weeks. Only 2 of them had preterm delivery. Only 14 of pregnant women had complications rest of them were normal. 60 out of 574 pregnant women were confirmed with RT-PCR for SARS-Cov-2.

Table 2 depicts that out 60 newborns from COVID-positive mothers, 35 of them were male and 25 of them were female. Birth weight for most neonate was normal. Only 3 neonates had weight <1500 g. Out of 60 neonate born from infected mothers, only 2 was tested positive for RT-PCR test. 6 out of 60 neonate born from COVID-19-positive mothers died. Fetal rate of newborn was normal.

Table 3 depicts the various clinical parameters of 2 COVID-19-positive infants. Both of them were delivered by caesarean

Table 1: Clinical details of pregnant women infected with COVID-19

S. No.	Parameters	*N*	(%)
1	Age in years		
	24–34	60	100
2	Mode of delivery		
	Normal	26	43.3
	LSCS	34	56.7
3	Gestational age at delivery		
	Term	57	95
	Preterm	2	3.3
	Stillbirth	1	1.7
4	Pregnancy outcomes		
	Abnormal	14	23.33
	Normal	46	76.66
5	Maternal RT-PCR for SARS-CoV-2 (Total number of deliveries *n*=574 (282 in July and 292 in August) Positive cases	60	10.45

COVID-19: Coronavirus disease 2019, RT-PCR: Reverse transcription polymerase chain reaction test, SARS-CoV-2: Severe acute respiratory syndrome coronavirus-2. Note - Out of 574 pregnant mothers, only 60 (12–July and 48 in August) was confirmed positive for RT-PCR test. Rest of them were tested negative. Result of some of them were unknown and not tested

Table 2: Clinical details of infants born with COVID-19-positive mothers

S. No	Parameters	*n*	%
1	Gender		
	Male	35	58.3
	Female	25	41.7
2	Weight in grams		
	<1500	3	5
	>1500	57	95
3	Neonatal outcome		
	Normal	57	95
	Preterm	2	3.3
	Stillbirth	1	1.7
4	Neonatal RT-PCR		
	Positive	02	3.3
	Negative	58	96.7
	(Sample was taken from nasal and throat swabs for confirmation RT-PCR test)		
5	Neonatal death		
	Died	6	10
	Survived	54	90
6	Fetal heart rate	Normal	100

COVID-19: Coronavirus disease 2019, RT-PCR: Reverse transcription polymerase chain reaction test

Table 3: Clinical parameters of COVID-19-positive infants

S. No.	Parameters	Case 1	Case 2
1	Sex	Female	Male
2	Gestational age, weeks	37 weeks	37 weeks
3	Birth weight, g	2300 g	2900 g
4	Apgar score (1,5)	8,9	8,9
5	Deliver mode	Caesarian	Caesarian
6	Sign and symptoms	Normal	Normal
	Heart rate	Normal	Normal
	Blood pressure	No	No
	Dyspnea	No	No
	Oxygen therapy		
7	Sample type	Nasopharyngeal	Nasopharyngeal

COVID-19: Coronavirus disease 2019

section. One of them was male and other female. Parameters including gestational age, birth weight, sign, and symptoms were normal.

Discussion

The results of this study show that 60 of 574 pregnant women hospitalized between July and August 2020 were positive for the new virus. 34 out of 60 pregnant women underwent cesarean section. The gestational age of most pregnant women was 38–40 weeks. Only 2 of them were born prematurely and 3 of them over weighed 1500 g. The center conducted a similar cross-sectional study on the transmission of SARS-CoV-2 to newborns of mothers with COVID-19. During the study, it was investigated whether SARS-CoV-2 infection in newborns was transmitted through the uterus on all SARS-CoV-2-positive patients who sent their children to school. Newborns were screened for vertical transmission of SARS-CoV-2 by nasopharyngeal swab RT-PCR testing within 60 min of birth. 201 woman's participated in the study. 2 newborns tested positive one delivered by normal vaginal delivery and other by C section. 2 infants who tested positive were born to low-risk mothers after estimated date of delivery (>40 weeks).

The incidence of ventricular tachycardia was 0.99% in this study. This study found no association between disease severity or symptoms at presentation and vertical transmission.[27]

In a review of 60 articles written by Petirosso E, it was confirmed that 19 newborns were confirmed positive for SARS-CoV-2 by RT-PCR.[28]

In another review, Ashraf *et al*. reviewed 21 articles in which 86 newborns were tested for vertical transmission; 4 of them were positive with RT-PCR COVID and 3 with nasopharyngeal swab, and 1 newborn was positive for amniotic fluid.[29]

Another retrospective study was done on the clinical characteristics and possible causes of cervical infection of COVID-19 in pregnant women which was not consistent with the present study. Medical records obtained from Zhongham Hospital, China, were reviewed to assess there was evidence of vertical transmission of SARS-CoV-2 in amniotic fluid, umbilical cord, and neonatal throat swab samples. Milk samples from the patients were also collected and tested after the first breastfeeding. Seven patients had temperature elevation. Another symptoms were also noticed including cough (4 out of 9 patients), myalgia (3 patients), sore throat (2), and fatigue (2). Two cases of fetal distress were observed. Contamination increased in our patient. As of February 04, 2020, no patients developed severe COVID-19 pneumonia or died. Neonatal asphyxia has not been observed in newborns. All 9 babies were born with Apgar scores of 8–9 at the 1st min and Apgar scores of 9–10 at the 5th min. Amniotic fluid, umbilical cord blood, cervical lymph nodes, and breast milk samples from 6 patients were tested for SARS-CoV-2 and all samples were negative for the virus.[30]

Another study was conducted on pregnancy and perinatal outcomes in women with respiratory distress. All pregnant women (17) who were patients with SARS in Hong Kong were included. Three deaths occurred and the patient mortality rate was 25%. Miscarriage occurred in 4 of 7 patients (57%) who applied in the first trimester. Four of the five patients presenting after 24 weeks were pre-operative. Both mothers are doing well without giving birth, but their on-going pregnancies are disrupted by fetal growth restriction. No newborns developed SARS and all SARS investigations were negative.[31]

Conclusion

The study results show that coronavirus was positive in 2 neonates, suggesting that intrauterine fetal infection can occur as a result of COVID-19 infections during later stage of pregnancy. However, the risk vertical transmission is small. Majority of the newborns remain asymptomatic with good clinical outcome.

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Conflict of Interest

None.

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