

RISK OF TRANSMISSION OF COVID- 19 TO NEWBORNS IN COVID-19 POSITIVE MOTHERS – A CASE SERIES

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Background: High risk of COVID-19 infection is reported in neonates of COVID-19-affected females along with adverse effects secondary to the infection. Limited work in literature is done on COVID-19 infection transmission from affected females to neonates born to them with few studies reporting vertical transmission of COVID-19.

Aim: To evaluate SARS-CoV-2 vertical or perinatal transmission and describe neonatal clinical findings and short-term outcomes in babies born to Covid- 19 positive mothers.

Methods: The study assessed 19 females and 19 neonates. All neonates immediately after birth were breastfed and kept with the mother in cases with the clinically stable situation for babies and mothers both. For all the babies, nasal swab samples were sent to detect SARS-CoV-2 on day 1 of their birth. The neonates were followed for 7-14 days after their birth followed by reassessment for SARS-CoV-2 from nasal swab specimens.

Results: All babies were healthy with no detection of SARS-CoV-2 seen from the neonates from the nasopharyngeal swabs. Also, no separation was done from mothers, and breastfed was given to all the neonates which showed no transmission of SARS-CoV-2 from breast milk to the neonates.

Conclusion: Benefits of breastfeeding are higher compared to the risk of perinatal or vertical transmission depicting that there is no need for separation of the neonate from SARS-CoV-2

positive mothers. Also, neonates can be breastfed from COVID-19-positive mothers without the risk of virus transmission.

Keywords: Coronavirus disease, COVID-19, newborns covid, perinatal transmission, SARS-CoV-2

Introduction

COVID-19 is a highly infectious disease reported first in Wuhan, China in 2019, and is caused by SARS-CoV-2, also known as the novel coronavirus. COVID-19 rapidly spread to other parts of the World and was declared a pandemic on 12 March 2020 by World Health Organization (WHO).¹ Various population groups are considered at higher risk of COVID-19 including subjects with low immunity and systemic diseases like diabetes mellitus. Pregnant females were also considered to have a very high susceptibility to encountering COVID-19 infection owing to the low immunity in pregnant females secondary to various physiological changes.²

COVID-19 further adds to stress in pregnant females with the main concern to virus transmission to the fetus. As COVID-19 is a relatively newer disease, the data concerning perinatal transmission is scarce in the literature with little knowledge of the obstetricians for the disease progression and transmission. Initially, as measures to prevent perinatal transmission, separation of the baby from the mother, avoiding the breastfeeding of the neonate, and cesarean section were advised to be practiced.³ The possibility of vertical transmission for COVID-19 infection was ruled out in initial reports of China. However, vertical transmission probability was confirmed in two neonates with IgM antibody detection in the blood of the cord in the UK. Also, two other reports confirmed positive RT-PCR reports from the nasopharyngeal swab of neonates from the COVID positive mothers. However, all these reports had lacking data on baby separation and breastfeeding.⁴

Initial reports from pregnancy and COVID-19 suggested formula feeding, separation of neonates from positive mothers, and cesarean section delivery. These practices were attributed to previous experience concerning coronavirus infection severity in pregnant females and aim to prevent neonates from encountering the infection. In females with no respiratory failure and fetal compromise, expert guidelines suggested and recommended vaginal deliveries in COVID-affected females along with breastfeeding following the critical precautions to prevent the risk of maternal to fetal transmission.⁵

A high risk of COVID-19 infection is reported in neonates of COVID-19-affected females along with adverse effects secondary to the infection. Limited work in literature is done on COVID-19 infection transmission from affected females to neonates born to them with few studies reporting vertical transmission of COVID-19. Transplacental transmission is also confirmed by the recent study of Vivanti AJ et al in 2020 who used virological tests in the placenta to confirm the transplacental transmission. Vivanti et al also depicted clinical manifestations and symptoms secondary to COVID infection in neonates.⁶ The present study aimed to evaluate SARS-CoV-2 vertical or perinatal transmission and describe neonatal clinical findings and short-term outcomes in babies born to Covid- 19 positive mothers.

Material and Methods

The present prospective clinical case series were assessed at Department of Paediatrics, Shri Shankaracharya Institute of Medical Sciences , Bhilai, Chhattisgarh from December 2020 to February 2021. The study population was comprised of COVID-19-positive females visiting the institute.

Following the protocol of the hospital, nasal swab was collected from all the subjects who were sent for RT-PCR assessment for SARS-CoV-2 from all the pregnant females during the time of admission to the institute. RT-PCR was utilized to detect SARS-CoV-2 from the nasopharyngeal swabs collected.

The pregnant females were included in the study finally after a positive status was confirmed by RT-PCR either 7 days before or within 7 days after delivering the baby. The present series also assessed neonates from COVID-19-positive mothers. These included neonates were followed following the delivery concerning any presentation of COVID-19 infection till they were discharged.

All neonates immediately after birth were breastfed and kept with the mother in cases with the clinically stable situation for babies and mothers both. For all the babies, nasal swab samples were sent to detect SARS-CoV-2 on day 1 of their birth. The neonates were followed for 7-14 days after their birth followed by reassessment for SARS-CoV-2 from nasal swab specimens.

While discharging, the parents were given instructions to get neonates immediately to the hospital if any clinical feature of COVID-19 or sepsis is suspected. For the present study, vertical transmission was suggested as the positive status of SARS-CoV-2 on RT-PCR results either in hospitalization duration, after discharge, or on follow-up.

Results

In the pregnant females, reported to the institute, following RT-PCR assessment, 19 females tested positive for SARS-CoV-2. These 19 females delivered 19 babies all singleton making the neonate sample size 19.

Description of cases

Case no 1 and 2– Mothers were stable and babies were born full term and kept with the mother after explaining hand hygiene and proper use of a mask to mothers. Babies were given breastfeeding within 1 hour of delivery and kept with their mothers. Baby no.1 remained well and was discharged on day 3 of life and the mother got discharged on day 5. Baby no. 2 required phototherapy for 48 hours starting on day 3 of life and got discharged on day 5.

Case no 3, 4, 16, and 17- all 4 mothers were kept in the ICU on oxygen support. Case no-3 delivered on day 2 of admission. Cases no-4 and 17 were delivered on the day of admission and shifted to ICU after delivery. Case no-16 delivered on day 3 of admission in ICU. Babies were kept in the nursery and given EBM or formula milk till mothers were in ICU. Breastfeeding was started when mothers were shifted towards for babies no-3 and 4. Baby no 16 was shifted to ICU immediately after birth as the baby was LBW (1.8 kg) and developed respiratory distress. The baby required ventilator support for 3 days, the septic screen came positive and empirical i.v. antibiotics were given as the blood culture came negative. Feeding was started with an NG tube from day 2. EBM was given to the baby till day 7. Breastfeeding was started on day 8 and discharged on day 9. Baby no- 17 was also shifted to NICU immediately after birth as the baby was VLBW (1.3kg) and developed respiratory distress. The baby was kept on nasal CPAP support for 2 days and shifted to oxygen by nasal prongs for the next 3 days. Feeding was started with a feeding tube from day 3. EBM or formula milk was given initially and shifted to KSF from day 7 and gradually breastfeeding was started on day 11. The baby was discharged on day 15 of life after completion of antibiotics as the blood culture was positive.

Case no 5-9, 11-15, 18, and 19- all mothers were asymptomatic or mildly symptomatic and babies were kept with the mother, and breastfeeding was started within 1-2 hours of delivery. Except for the need for phototherapy, none of the babies had any other issues and got discharged in healthy condition.

Case no 10- mother had mild symptoms but the baby was shifted to NICU as the baby developed meconium aspiration syndrome. The baby was kept on ventilator support for 4

days and then shifted to nasal CPAP for 2 days. The baby was weaned off oxygen gradually. The baby was shifted to breastfeeding from day 8.

Observations

Out of a total of 19 women 4 of them required oxygen support in the intensive care unit while rest 15 were kept in the ward as they had minimal symptoms or no symptoms. Out of these 19 patients

16 had delivery by lower segment cesarian section (LSCS), and 3 had a normal vaginal delivery (NVD). A total of 6 babies were born in less than 37 weeks gestation with a mean birth weight of 1.83 ± 0.387 kg and 13 babies were born after 37 weeks of gestation with a mean birth weight of 2.83 ± 0.22 kg. (Table no 2)

Out of a total of 19 babies, 16 were well, breastfeeding, and discharged between 3-7 days of life. 3 babies were shifted to the neonatal intensive care unit (NICU) due to respiratory distress. RT-PCR of the nasal swab was sent for all babies. SARS-CoV -2 reports were negative for all 19 babies which were sent on day 1 of life. Sample for SARS-CoV -2 was sent again on day 3 of life for 3 NICU admitted babies. The report came negative for all three NICU babies. (Table no 3).

On follow up 14 babies came between 7-14 days of life and 5 babies followed up after 14 days. All babies were healthy on follow-up. Samples for SARS-CoV2 were advised for all 14 babies but only 10 were tested. All 10 reports came negative. For 4 babies who were brought up after 14 days, testing was not done as all babies were doing fine.

Discussion

There are low chances of neonates having COVID-19 infection, even if, they are born to mothers who are COVID positive as suggested by CDC (Centers for Disease Control). These chances are very low when accurate and suggested precautions are followed during the neonate's care including hand hygiene practice and wearing the mask. The practice of rooming-in practice of keeping babies with the mothers has added advantages of improved bonding between newborn and mother and facilitating the breastfeeding practice.⁷ However, a few precautions are recommended for these cases including handwashing for a minimum of 20 seconds using soap and water before holding the baby, wearing a mask, and maintaining 6 feet between the neonate and the COVID-positive mother. The breastfeeding practice is also supported recently as breastmilk is the best source of nutrition for newborns and protects against various illnesses which is also supported by Chen H in 2020.⁸

In the present study, a Caesarean section was performed for delivery in 16 females. These results were consistent with the previous study of RCOG⁹ where a cesarean section was done

in 59% covid positive females. Also, these findings were supported by the study of Pallavi D et al¹⁰ in 2020, where in their systematic reviews of September 2020, subjects reported a cesarean section rate of 72% which was comparable to the results of the present study.

The present study aimed to evaluate SARS-CoV-2 vertical or perinatal transmission and describe neonatal clinical findings and short-term outcomes in babies born to Covid-19 positive mothers. The study results showed that no perinatal or vertical transmission was seen for COVID-19 to neonates from SARS-COV-2 positive mothers, and all the neonates were healthy till their last follow-up. These results agreed with the previous studies of Zamaniyan M et al¹¹ in 2020, Seth S et al¹² in 2020, and Zeng L et al¹³ in 2020 where authors reported a minimal rate of COVID-19 transmission to the neonates born to COVID-19 positive mothers. However, these findings were contradictory to the results of the study of ElHalik M et al¹⁴ in 2020 conducted in Dubai, where authors reported 5.5% positive neonates born to COVID-positive mothers suggesting the risk of transmission, and all the positive neonates were reported within 48 hours of their birth.

Another study conducted in New York also reported no evidence of vertical transmission of SARS-CoV-2 to newborns from SARS-CoV-2-positive mothers. These data were reported from the consideration of 101 newborns who were first born to mothers who were either suspected to have or were born to SARS-CoV-2 positive females. The data were collected from the epicenter of the COVID-19 pandemic and a large medical center.¹⁵

The results of the present study also showed that no newborn was found to be positive for SARS-CoV-2 on day 1 of their birth and neither on the follow-up. This can be attributed to raised immunity from breastfeeding which can have a protective role against SARS-CoV-2 infection in newborns. Also, breastmilk is reported to have protective action against various pathogens as confirmed by WHO in 2000 and Lawrence RM¹⁶ in 2011. SARS-CoV-2 is not found in breast milk which is confirmed by Hu X et al¹⁷ in 2020 and Wu Y et al¹⁸ in 2002. Also, Fox A et al¹⁹ in 2020 confirmed that breastmilk contains anti-SARS-CoV-2 Ig A having a protective role.

Conclusion

Considering its limitations, the present case series concludes that on weighing, the benefits of breastfeeding are higher compared to the risk of perinatal or vertical transmission depicting that there is no need for separation of the neonate from SARS-CoV-2 positive mothers. Also, neonates can be breastfed from COVID-19-positive mothers without the risk of virus transmission.

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TABLES

S N	Age	Gestational Age	Mothers Symptoms	Mode of delivery	Baby sex	Weight of baby	RT-PCR of the baby on the Day of life-1	Baby complication	Follow-up day of life	Follow up RT-PCR
1	28	39 +1wk	Asymptomatic	LSCS	F	2.6kg	Neg	Nil	10	Neg
2	23	37+5wk	Mild	NVD	F	3kg	Neg	Nil	14	Neg
3	26	36wk	Severe	LSCS	F	2.1kg	Neg	Nil	7	Neg
4	36	36+3wk	Moderate/Severe	LSCS	M	2.3kg	Neg	Nil	9	Not done
5	27	40+1wk	Mild	LSCS	F	2.8kg	Neg	Nil	No	Not done
6	32	39+5wk	Mild	LSCS	M	3kg	Neg	Nil	8	Neg
7	30	37+1wk	Asymptomatic	LSCS	F	3kg	Neg	Nil	11	Not done
8	33	39wk	Mild	LSCS	M	2.7kg	Neg	Nil	15	Neg
9	20	39+2wk	Mild	LSCS	M	3.4kg	Neg	Nil	8	Neg
10	21	36+5wk	Mild	LSCS	F	2.8kg	Neg	NICU admit	17	Not done
11	30	34+5wk	Mild	NVD	M	1.6kg	Neg	Nil	10	Neg
12	32	38+4wk	Mild	LSCS	M	2.6kg	Neg	Nil	12	Neg
13	24	38+1wk	Mild	LSCS	M	2.7kg	Neg	Nil	No	Not done
14	32	39+5wk	Asymptomatic	LSCS	F	2.7kg	Neg	Nil	13	Neg
15	23	42+4wk	Asymptomatic	LSCS	F	3kg	Neg	Nil	No	Not done
16	30	33+1wk	Moderate/Severe	NVD	M	1.8kg	Neg	NICU admit	18	Not done
17	35	30wk	Moderate/Severe	LSCS	M	1.3kg	Neg	NICU admit	22	Not done
18	28	38+2wk	Mild	LSCS	F	2.3kg	Neg	Nil	14	Neg
19	31	39+3wk	Mild	LSCS	M	2.7kg	Neg	Nil	No	Not done

Table no 1 – Details of Covid -19 positive mothers and their babies

Mode of delivery	No of patients	Indications
Lscs	16	4 meconium-stained amniotic fluid with foetal distress 6 – pih 1 –obstructed labour 5- previous lscs
Normal vaginal delivery	3	Spontaneous onset and progression of labour

Table no.2 - Details of delivery of Covid -19 positive mothers

Parameters	No of babies	Details
Gestational age of babies	19	More than 37 weeks – 13 Less than 37 weeks -6
Median gestational age and range	19	Median 38.1 weeks Range-30 weeks to 40 weeks 4 days
Mean weight	More than 37 weeks -13 babies	2.83+_0.22kg
Mean weight	Less than 37 weeks -6 babies	1.83+_0.387kg
Outcome	16 babies	Well babies, shifted to mother side and discharged
	3 babies – nicu admission – all 3 for preterm with respiratory distress	All babies – discharged
RT-PCR of babies	19	Negative for all
Breastfeeding	19	1. Exclusive breastfeeding /ebm with ksf -13 babies 2. Transient formula feeding for 2-3 days followed by ebm or breastfeeding -3 babies 3. Iv fluids – 3 babies And were gradually shifted to oral feeds

Table no 3- Details of babies born to Covid -19 positive mothers