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The outcome of newborn babies born to COVID-19 positive mothers - An observational study from Eastern India

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Abstract

Background: The study was done on outcome of the newborns born to COVID-19 positive mothers in a tertiary care hospital.

Method: For this retrospective observational study, the COVID-positive mothers who delivered between August 1, 2020 to July 31, 2021 were identified. The mothers belonged to middle socioeconomic group, had regular antenatal care and had access to good nutrition and healthcare. The data of their babies was collected. All the babies had a Reverse-Transcriptase Polymerase Chain Reaction (RTPCR) test for diagnosis of COVID-19 infection. The babies who were well, were roomed in with their mothers and exclusively breastfed. Sick babies were admitted to the Neonatal Intensive Care Unit (NICU).They were managed according to standard guidelines. No COVID-specific treatment was given to any of them. Their course in the hospital was recorded and the data analysed.

Results: Among 52 babies, only 18.4% were positive on RTPCR testing. 32.7% were preterm. 23 (44.2%) babies required NICU admission while the rest were roomed in with the mother. Out of the 23 NICU admissions, 14 (26.9%) of them had sepsis, 6 (11.5%) had RDS, 6 (11.5%) had pneumonia, 14 (26.9%) had hyperbilirubinaemia while 2 (3.8%) had meningitis. None of the babies fulfilled the criteria for neonatal multisystem inflammatory syndrome. The babies who were positive on RTPCR testing were found to have some complications, of which sepsis and hyprerbilirubinaemia were the most frequent. Most of the babies required only appropriate supportive care with intravenous (IV) fluids, antibiotics and phototherapy. Continuous positive airway pressure (CPAP) was administered to 3 (5.8%) babies for RDS and 2 of them needed mechanical ventilation. All the babies were discharged in a stable condition.

Conclusion: The rate of perinatal acquisition is low. The babies of COVID positive mothers respond well to treatment, and more than half are asymptomatic. They are not at increased risk of mortality though there are complications needing treatment.

Keywords: SARS-COV2; pregnancy; preterm; perinatal; neonatal; COVID-19, RTPCR; sepsis; hyperbilirubinaemia

Introduction

The novel coronavirus disease (COVID-19) was first identified in December 2019 in Wuhan, China [1] and declared as a pandemic in March 2020 by the World Health Organization. The COVID-19 pandemic has led to significant changes in healthcare delivery and clinical management of pregnant women and their newborns, as the availability of healthcare resources, rates of infection, and scientific data continue to evolve.

Limited information is available on the consequences of previous coronavirus outbreaks like severe acute respiratory syndrome coronavirus 1 (SARS-CoV-1) and Middle East respiratory syndrome coronavirus (MERS-CoV)—on pregnancy [2]. COVID-19 shares several features with SARS-CoV-1 and MERS-CoV and seems to have a similar pathogenic potential [3].

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A meta-analysis by Toro et al showed that although adverse outcomes such as ICU admission or patient death can occur, the clinical course of COVID-19 in most women is not severe and the infection does not significantly influence the pregnancy [4]. In a meta-analysis by Wei et al, COVID-19 in pregnancy was associated with preeclampsia (OR 1.33, 95% CI 1.03 to 1.73), preterm birth (OR 1.82, 95% CI 1.38 to 2.39) and stillbirth (OR 2.11, 95% CI 1.14 to 3.90) [5]. An incomplete understanding of disease pathogenesis and viral spread has resulted in evolving guidelines to reduce transmission from infected mothers to neonates [6]. This study is being done to understand the outcome of newborn babies born to COVID-19 positive mothers in Eastern India, especially in the context of the emergence of the second wave with the new variants of the virus.

The study was done on outcome of the newborn babies born to COVID-19 positive mothers in a tertiary care centre in Eastern India.

Materials and method

Study design was Retrospective observational study. Study population was neonates born to COVID-19 positive mothers in Ramakrishna Mission Seva Pratishthan, Kolkata, India. The study period was August 2020 to July 2021.

Operational definition: COVID positive was defined as RTPCR positivity in the nasopharyngeal swab taken from the expectant mothers within 14 days prior to delivery.

Method of data collection

All babies born to COVID positive mothers from August 2020 to July 2021 were identified and their data collected after obtaining the necessary permission from the institutional Ethics Committee. The healthy babies were roomed in with their mothers and were exclusively breast fed as per the WHO protocol. The sick babies were admitted to the NICU for further care. If a mother was too ill to take care of her baby, the baby was sent to the NICU for observation and care. Nasopharyngeal swab testing was done for all babies on day 2 of life and if positive, a repeat sample was sent after the 7th day. The course of their hospital stay was documented and the data analysed.

Statistical analysis

MS excel spreadsheet was used for recording and coding data. SPSSv23 was used. Means/ Standard deviations were used for descriptive statistics and medians/ IQRs for continuous variables. Groups of continuously distributed data were compared using independent sample 't' test. For non-normally distributed data, non-parametric tests were used (Wilcoxon Test). OpenEpi (version 3.01) was used to find out p-value for Fisher's exact test.

Results

A total of 52 babies were born to mothers who tested positive for COVID-19 during the study period, out of whom, 29 were roomed in with mother and required standard care. 23 of them were admitted to the NICU and required some form of management. Except for 2 babies who were born with Apgar scores of 4 and 5 respectively, there were no others who had birth asphyxia and the remaining 50 had Apgar scores equal to or more than 7. All the babies were discharged in a stable condition.

Table 1 shows the perinatal details.17 (32.7%) of the babies were born preterm and the mean birth weight was 2.70 ± 0.55kg. The male to female ratio was 1.7:1 and most (73.1%) were delivered by LSCS.

Table 1: Summary of perinatal details.

Perinatal details	*Mean ± SD || Median (IQR) || Min-Max || Frequency (%)*
Gestational Age (Weeks)	37.10 ± 2.28||37.50 (36.00-38.00)||27.00 - 40.00
Gestational age	
<37 Weeks	17 (32.7%)
≥37 Weeks	35 (67.3%)
Mode of delivery	
LSCS	38 (73.1%)
ND	12 (23.1%)
Breech VD	2 (3.8%)
Birth Weight (Kg)	2.70 ± 0.55||2.80 (2.58-3.01)||0.91 - 3.80
Birth weight	
<2.5 Kg	12 (23.1%)
≥2.5 Kg	40 (76.9%)
Baby gender	
Male	28 (53.8%)
Female	24 (46.2%)

Table 2 shows the summary of neonatal morbidity of all babies born to COVID positive mothers. 23 (44.2%) of the participants required NICU admission while the rest were roomed in with the mother. Out of the 23 babies who were admitted in the NICU, 14 (26.9%) of them had

sepsis, 6 (11.5%) had RDS, 6 (11.5%) had pneumonia, 14 (26.9%) had jaundice while 2 (3.8%) had meningitis. None of the babies fulfilled the criteria for Neonatal multisystem inflammatory syndrome associated with SARS- COV-2.

Table 2: Summary of neonatal morbidity.

Neonatal morbidity	*Present*	*Absent*
Birth asphyxia	2 (3.8%)	50 (96.2%)
NICU admission	23 (44.2%)	29 (55.8%)
RDS	6 (11.5%)	46 (88.5%)
Pneumonia	6 (11.5%)	46 (88.5%)
Jaundice	14 (26.9%)	38 (73.1%)
Sepsis	14 (26.9%)	38 (73.1%)
Shock	0 (0.0%)	52 (100.0%)
Meningitis	2 (3.8%)	50 (96.2%)
Neonatal PIMS	0 (0.0%)	52 (100.0%)
Other morbidity	5 (9.6%)	47 (90.4%)

Table 3 shows the summary of neonatal management and final outcome. Out of the total number of 52 babies, 23 required NICU admission. The mean day of NICU admission was 2.41 ± 2.82 day of age and the mean duration of NICU stay was 12.04 ± 12.02 days. Most required only supportive care with IV fluids, antibiotics for sepsis and phototherapy for hyperbilirubinemia. CPAP was administered to 3 (5.8%) babies for RDS and 2 of them needed mechanical ventilation.

Table 3: Summary of management and final outcome.

Outcome	*Mean ± SD || Median (IQR) || Min-Max || Frequency (%)*
Day of NICU admission	2.41 ± 2.82 || 1.00 (1.00-3.00) || 1.00 - 14.00
Duration of NICU stay	12.04 ± 12.02 || 11.00 (4.50-14.00) || 2.00 - 57.00
Treatment	
Observation	31 (59.6%)
IV fluids + Antibiotics + Phototherapy	9 (17.3%)
IV fluids + antibiotics	6 (11.5%)
CPAP	3 (5.8%)
Ventilation	2 (3.8%)
Phototherapy	1 (1.9%)
Final outcome (Discharged)	52 (100.0%)

RT PCR for COVID-19 was sent from the nasopharyngeal swab for 49 babies out of whom 9 tested positive while the rest were negative (Table 4). Only 18.4% of the newborns of COVID positive mothers acquired the infection.

Table 4: Distribution of the participants in terms of RTPCR (n = 49).

RTPCR	*Frequency*	*Percentage*	*95% CI*
Positive	9	18.4%	9.2% - 32.5%
Negative	40	81.6%	67.5% - 90.8%

Of the 9 newborns who tested positive for COVID-19, 4 (44.4%) had sepsis, 5 (55.5%) had hyprbilirubinaemia, 2 (22.2%) had RDS, and 3 (33.3%) had pneumonia (Table 5). In comparison, of the 43 babies who were negative on RTPCR testing, 9 each (20.9%) had sepsis and hyperbilirubinaemia, 4 (9.3%) had RDS, and 3(6.9%) had pneumonia. The differences were not statistically significant.

Table 5: Comparison of the common causes of morbidity in COVID positive vs COVID negative babies.

	COVID +ve (9)	*COVID –ve (43)*	*P- value (Fisher exact test)*
Sepsis	4	9	0.29
Jaundice	5	9	0.09
RDS	2	4	0.55
Pneumonia	3	3	0.11

Discussion

This study of 52 newborns born to COVID positive mothers adds to the growing amount of information about the clinical manifestations and outcomes of such babies.

Of all the babies in this study, only 18.4% were positive on RTPCR testing. The rate of perinatal acquisition was low. Our findings about a low rate of perinatal acquisition were in concordance with other studies [7]. In a Spanish cohort, perinatal acquisition occurred in 5/72 (6.9%) of exposed newborns born to SARS-CoV-2-positive mothers, with no difference found between vaginal and caesarean births [8]. Data from the National Registry for Surveillance and Epidemiology of Perinatal COVID-19 Infection (NPC-19) found 44/2287 (1.9%) of viral tests to be positive in neonates born to mothers with confirmed SARS-CoV-2 infection [9].

All the above studies show an even lower rate of neonatal positivity compared to this one. Kolkata is a densely

populated city and was in the middle of a severe second wave of the COVID pandemic during the period of the study. This might explain the rates of noenatal positivity too, as the transmissibility and virulence of the virus are likely to have been higher.

Several studies describe fetal complications of maternal SARS-CoV-2 infection including medically indicated preterm birth, growth restriction, and miscarriage [10]. Given the hypercoagulability seen in patients with COVID-19, these fetal complications are hypothesized to be due to compromised perfusion in the maternal and/or fetal placental vasculature and possible thrombotic changes [11].

In this study, there was one intrauterine death of the fetus of a COVID- positive mother. A review of 51 cases of SARS-CoV-2 infection in pregnant women reported an increase in medically indicated preterm birth and caesarean delivery in 96% of cases and the median gestational age was 36.5 weeks [12]. In our study, the preterm birth rate was 32.7% and 73.1% of the babies were born by caesarean delivery.

Meta-analysis of recent good-quality cohort studies with comparative data provides clear evidence that symptomatic or severe COVID-19 in pregnancy is associated with a considerable risk of preeclampsia, preterm birth and low birth weight [13]. In our study 23.1% of the babies had low birth weight. A review article by Paola Ayala Ramirez et al postulated that COVID infection in pregnant women was associated with a high risk of adverse pregnancy outcomes, such as intrauterine growth restriction, premature rupture of membranes, fetal distress, preterm delivery, spontaneous abortion and stillbirth [14]. In a study by Nayak on 165 neonates born to COVID positive mothers, clinical characteristics of neonates were meconium-stained amniotic fluid in 23.63%, prematurity in 16.9%, respiratory distress in 10.5%, moderate to severe hypoxic ischemic encephalopathy in 3.6%, sepsis in 7% and hyperbilirubinemia in 8.7% [15]. In our study, 11.5% had respiratory distress syndrome and pneumonia, 26.9% had jaundice and sepsis and 3.8% had meningitis. Neonatal multisystem inflammatory syndrome was not detected in any of the babies.

Management of SARS-CoV-2 infection in neonates is largely supportive, including respiratory support, oxygen, fluid and electrolyte therapy and antibiotics if there is bacterial co-infection. In our study too, the majority of the babies who required NICU admission needed only supportive treatment with IV fluids and antibiotics for sepsis and only 5 required ventilation. Established guidelines for the management of the various complications were followed. The 9 babies who tested positive had one or more of the following complications- sepsis, hyperbilirubinaemia, RDS and pneumonia. It was encouraging to find that all of them eventually responded to management in the NICU, and recovered.

The well babies were roomed in with mothers and exclusively breast fed. They were all discharged in good condition. The possibility of transmission via breast milk is currently under investigation, as initial studies reported negative viral PCR results sent on breast milk samples from infected mothers [16].

The WHO advises against separation of the mother and newborn citing that physiological benefits of breastfeeding and skin-to-skin contact outweigh the likely limited risk of maternal to newborn transmission especially in the context of the low virulence within the neonatal population [17].

It appears that being born to a COVID-positive mother does not confer an accelerated risk of mortality upon the newborn, though the possibility of complications like sepsis, hyperbilirubinaemia, RDS and pneumonia is higher. The mild illness with low mortality has been described in another metaanalysis [18]. In addition, data from a large cohort suggests perinatal transmission of SARS-CoV-2 infection and increased morbidity in infected infants [19], which compares with our observation that babies who tested positive had more morbidities.

This study has a few limitations. The sample size was small and the 2nd RTPCR test could not be done as most babies were stable and discharged by day 7 of life. Though the viral virulence was found to be low, the viral variant had not been identified. In addition, this is the experience of a single centre. Larger studies are needed to obtain more accurate knowledge about the outcome of newborns born to COVID-positive mothers. A relevant area of further study would be to compare these babies with those born to normal, non–COVID mothers, to determine if these babies have increased morbidity.

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Conflicts of interest

Authors declare no conflicts of interest.

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