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Neonatal outcome in COVID-19 pregnant women in District Hospital, Ballari

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ABSTRACT

Objectives: This study aims to study the neonatal COVID-19 incidence and outcome in District Hospital, Ballari.

Materials and Methods: This is a retrospective analytic study of 171 neonates born to COVID-19-positive pregnant women delivered at District Hospital, Ballari, Karnataka, during the period of April 2020–September 2020.

Results: The study was conducted among 171 babies delivered to COVID-19-positive pregnant women delivered in District Hospital, Ballari. Out of which, 62 babies were admitted in SNCU for various indications such as respiratory distress syndrome (4), meconium aspiration syndrome (8), other causes of respiratory distress (13), birth asphyxia (8), neonatal jaundice (14), hypoglycemia (1), preterm care (8), and neonatal COVID-19 (1). Out of 171 neonates born to COVID-19-positive mothers, only 7 (4%) neonates were tested positive for reverse transcription-polymerase chain reaction. A total of three babies were symptomatic, among those, two had refusal of feeds and one had respiratory distress and hypernatremic dehydration.

Conclusion: In this study, COVID-19-positive neonates had milder manifestation with transmission rate of 4%. All symptomatic babies got cured and discharged successfully with average length of stay for 4 days. Although our conclusions are limited, the findings conclude that neonatal COVID-19 outcome is not as severe as seen in adults.

Keywords: COVID-19, COVID-19-positive pregnant women, Neonates and neonatal COVID-19 status

INTRODUCTION

COVID-19

The newly known 2019-nCoV, which appears to have originated in Wuhan, China, is spreading rampantly worldwide.[1] On March 11, 2020, COVID-19 was pronounced as pandemic by the World Health Organization.[2] A number of cases of neonates born to COVID-19-positive mothers have been recorded. The study was conducted to describe the clinical profile of neonates born to COVID-19-positive mothers and to see the association of neonatal COVID-19 status.

A clinical syndrome caused by the coronavirus (SARS-CoV-2) became a pandemic following an outbreak of viral pneumonitis, first identified in Wuhan, Hubei, China. The disease manifestation was ranging from mild upper respiratory tract infection to severe pneumonitis, acute respiratory distress syndrome (ARDS), and death.[3] Relatively few cases have occurred in children and neonates and they seem to have a more favorable clinical course than other age groups.[4] In COVID-19, the incidence in the neonatal population remains low, it appears that the naive of

the neonatal immune system may have afforded protection against the "cytokine storm" experienced by adults.[5]

Apparently, pregnant women are a vulnerable group of population susceptible to the COVID-19 infection due to physiological changes in the immunological and circulatory parameters. As a result, newborns of COVID-19-positive mothers are at risk of infection as well as adverse outcomes.

Multiple routes of transmission apart from postpartum transmission have been postulated including transplacental *in utero*, the immediate peripartum period through fetoplacental bleed or amniotic fluid, and breast milk.[6,7] The first study describing the clinical characteristics and investigating the possibility of vertical transmission of SARS-CoV-2 in nine pregnant women with laboratory-confirmed COVID-19, demonstrated lesser severity, and no evidence of vertical transmission.[8,9] Vivanti *et al*. demonstrated the transplacental transmission, confirmed by comprehensive virological tests in the placenta, along with symptoms and clinical manifestations in the neonate.[10] Thus, the study was conducted to know the neonatal COVID-19 incidence and outcome in our District Hospital, Ballari.

MATERIALS AND METHODS

The hospital in which study is done is a teaching hospital and tertiary referral center for neonatal care. The annual delivery rate is approximately 5500, with nearly 1000 SNCU admissions per year. As per the recommendations, all the health-care staffs followed donning and doffing sequence of complete personal protective equipment which included goggles, cap, double layer gloves, N95 mask, shoe covers, and overall.

Research methods

Retrospective analytic study done in District Hospital, Ballari, Karnataka.

Subjects

Neonates born to mothers with confirmed 2019-nCoV infection in District Hospital, Ballari, from April 2020 to September 2020 were included in analysis.

Data collection

The medical records of all COVID-19-positive pregnant women who delivered from April 2020 to September 2020 were reviewed. Details of all neonates born to COVID-19-positive mothers were collected. Data were collected from the patient records and included address, gestational age, comorbidities, the outcome of pregnancy, and information on neonates including birth weight, Apgar score, perinatal complications, and clinical course during the hospital stay. Also noted the time from onset of symptoms to diagnosis, vital signs on admission, laboratory tests, chest X-ray images, treatment received and duration of hospital stay.

Testing strategy

As per SOP provided by National Neonatology Forum, Karnataka chapter (NNF-K) in collaboration with UNICEF, HFO all neonates born to COVID-19-positive mothers were tested[11]. The nasopharyngeal and oropharyngeal swabs were collected under aseptic precautions, after cleaning the neonate, within 24–36 h of birth and were sent to the microbiology laboratory, Vijayanagara Institute of Medical Sciences, Ballari, where the 2019-nCoV RNA was detected by reverse transcription-polymerase chain reaction (RT-PCR) method.

Clinical care policy

All stable neonates born to COVID-19 confirmed mothers in District Hospital, Ballari, were roomed in and breastfed ensuring all the universal and contact precautions against COVID-19 infection. If the neonate tested negative, the mother neonate dyad was discharged as per the hospital protocol. Neonates born to COVID-19 positive mothers, requiring SNCU care for any indication, were nursed in separate designated SNCU block. COVID-19-positive neonates, if requiring SNCU care, were managed in another separate COVID SNCU; stable COVID-19-positive neonates were roomed in with mother and breastfed.

The protocol for clinical management and investigation of neonates was based on NNF-K guidelines and recommendations as per the currently available evidence.[11-14] No specific treatment was given against COVID-19 infection for neonates who tested positive for COVID-19 infection.

Discharge policy

Discharge of the mother neonate dyad was done as per the SOP by NNF-K; stable neonates were kept for a minimum of 2–3 days and discharged once the mother is hemodynamically stable. Regarding precautions and self-protection against COVID-19 infection at home were counseled in detail to all mothers and caregivers during discharge. Telephonic follow-up was done at the 14th and 29th day for all positive neonates.

RESULTS

Among the 171 neonates born to 2019-nCoV-infected mothers, 62 neonates got admitted in SNCU for various indications. There were 34 males and 28 females; 19 were low birth weight (LBW), out of which 3 are very LBW 1000–1499 g, 1 was

extremely LBW with 920 g of birth weight. There were 58 singleton and 02 twin deliveries. Out of 62 admissions, 60 got successfully discharged, 1 left against medical advice, and 1 expired due to severe meconium aspiration syndrome within 24 h of life in spite of ventilator support.

According to our study [Table 1], the incidence of positive neonatal COVID cases was 4%, out of which 42.8% symptomatic [Table 2]. Out of seven COVID-positive babies, three babies were symptomatic, two had refusal of feeds, and only one got admitted in SNCU [Table 3] with respiratory distress with hypernatremic dehydration, this baby was single, term, male, delivered by LSCS with breech presentation, baby cried immediately after birth, liquor was clear, Apgar at 1'- 7/10, at 5'- 9/10, birth weight was 3.570 kg.

On day 3rd of life, the baby had symptoms of fever, weight loss >10% of birth weight. As per SNCU protocol, investigations sent and treatment started. Investigations were showing hypernatremia with serum sodium of 152.3 mmol/L, so diagnosed as hypernatremic dehydration with COVID-19 positive and treated for hypernatremia.

On the 4th and 5th day, the baby was asymptomatic and stable. On the 6th day of life, the baby had tachypnea with subcostal retractions with desaturation 85% at room air, got improved on 4 lit/min of oxygen through hood. All acute-phase reactants were raised with normal blood counts. On the 7th day, the baby got weaned off from oxygen and the baby was active and stable. On the 8th day, the baby shifted to mother side, in step-down, and on the 11th day of life, the baby was discharged.

Table 1: Details of neonates born to COVID-19 mothers.

Characteristics	Frequency (*n*=171)	Percentage
Neonatal COVID		
Positive	7	4
Negative	164	96
Maturity		
Term	163	95.33
Preterm (<37 weeks)	8	4.67
Birth weight (g)		
≥2500	137	80.11
1500–2499	30	17.5
1000–1499	3	1.75
<1000	1	0.58
Type of delivery		
Normal delivery	54	32.3
LSCS	113	67.7
Neonates required admissions		
Yes	62	36.2
No	109	63.8
Neonatal mortality		
COVID negative	2	1.16
COVID positive	0	00
Maternal mortality		
Maternal mortality	1	0.59

Table 2: Details of COVID-19-positive neonates.

Characteristics	Frequency (*n*=7)	Percentage
Neonatal COVID-positive neonate (*n*=7)		
Symptomatic	3	42.8
Asymptomatic	4	51.2
Maturity		
Term	5	71.4
Preterm (<37 weeks)	2	28.6
Birth weight (g)		
≥2500	5	71.4
1500–2499	2	28.6
Type of delivery		
Normal delivery	2	28.6
LSCS	5	71.4
Neonates required SNCU admissions		
Yes	1	14.2
No	6	85.8
Sex		
Male	2	28.6
Female	5	71.4
Neonatal outcome		
Successfully discharged	7	100
Referred/expired	0	0

Table 3: Indications of neonatal admissions.

Indication	Number (*n*=62)	Percentage
COVID-19 positive	1	1.6
Respiratory distress syndrome	4	6.4
Meconium aspiration syndrome	8	12.9
Other causes of respiratory distress	13	21
Preterm care	8	12.9
Dehydration fever	5	8
Hypoglycemia	1	1.6
Hypothermia	0	0
Jaundice	14	22.5
Sepsis	0	0
Hypoxic ischemic encephalopathy	8	12.9

All COVID-19-positive neonates remained asymptomatic as per the last follow-up telephonic call on day 14/day 29 of life. There were two deaths in the cohort; both were tested negative for COVID-19. One maternal death due to ARDS and the baby were asymptomatic and tested COVID-19 negative.

DISCUSSION

Our study was conducted as per SOP provided by NNF-K for testing and clinical protocol. This study describes seven COVID-19-positive neonates of the total 171 neonates

tested with incidence of 4%. Only one of the COVID-19-positive neonates developed severe manifestations of the disease – respiratory distress syndrome with hypernatremic dehydration and was discharged subsequently. We followed the policy of rooming in with mother and direct breastfeeding with precautions in stable neonates born to COVID-19-positive mothers. A total of 96% of the roomed neonates tested negative for COVID-19. The positivity rate in neonates is variable in the previous studies. A study conducted in the Department of Paediatrics, Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi, India, showed positivity rate of 10.7%.[15] In a multicentric study from Turkey,[16] the rate has been described as 3.3%, whereas in a systematic review[17] and two other studies,[18,19] it is observed to be 2.7% (1/37) to 9.99% (3.3%) and 4.2% (3/72). In our study, we have good sample number of 171 babies delivered at our hospital. We have practiced rooming-in even for asymptomatic COVID-19-positive babies.

CONCLUSION

In COVID-19 pandemic, caring of babies and families was challenging for neonatal nurses and midwives. While babies have been infected, the naive of the neonatal immune system in relation to the inflammatory response would appear to be protective, with further responses achieved with the consumption of human milk. The World Health Organization had made clear recommendations about the benefits of breastfeeding, even if the mother and baby dyad were COVID-19 positive, if they remain well. The mother and baby had to be kept in same room and the mother was made able to participate in her baby's care and develop her mothering role. Close cooperation between obstetric and pediatric departments was encouraged to deliver well-prepared resuscitation for neonates in the delivery room. In our study, transmission rate of 4% is seen. All symptomatic babies got cured and discharged successfully with average length of stay for 4 days. As 2019-nCoV was known to have pathogenic potential, to cause severe maternal or perinatal adverse outcomes, we recommended systematic screening of any suspected 2019-nCoV infection during pregnancy and extended intensive follow-up for confirmed mothers and their fetuses.

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Ethical approval

The study was approved by the Institutional Ethics Committee.

Declaration of patient consent

Patient's consent not required as patients identity is not disclosed or compromised.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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