

Outcome of Covid-19 Positive Newborns Presenting to a Tertiary Care Hospital

(This is a preprint version of an article submitted for publication in Indian Pediatrics. Changes may be made before final publication)

PII: S097475591600263

ABSTRACT

Neonatal data regarding SARS-CoV-2 is sparse from India. On review of hospital records from April-August, 2020, 18/423 (4.25%) neonates were SARS-CoV-2 RT-PCR positive. 15 (83.3%) neonates recovered and 3 (16.6%) succumbed. Only 50% of the positive babies had positive mothers/ caretakers, a contact could not be traced in others.

Keywords: *Contact tracing, Horizontal transmission, Vertical transmission.*

The symptoms of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) positive cases are highly variable and within the paediatric population, neonates and infants are more severely affected. Neonates can acquire infection vertically during delivery or horizontally from caregivers. As neonatal data on the disease is limited, we, herein, share our experience.

Medical records of all out-born neonates presenting for admission to the NICU from April 1 to August 31, 2020 were reviewed. Clearance from institutional ethics committee was taken.

For planned referrals and untested neonates in the emergency ward, mother and baby's SARS-CoV-2 reverse transcriptase-polymerase chain reaction (RT-PCR) of nasopharyngeal swab was requested. If positive, babies were transferred to the COVID19 positive NICU and managed as per standard NICU protocols. Repeat testing for SARS-CoV-2 infection was carried out as per Indian Council of Medical Research/ Ministry of Health and Family Welfare guidelines every 5-7 days, if baby remained symptomatic or developed new onset symptoms. Expressed breast milk of SARS-CoV-2 negative (RT-PCR of nasopharyngeal/ throat swab) mothers donated to the hospital human milk bank was administered to stable feeding babies. When mothers were available and the baby's clinical condition was satisfactory, direct breastfeeding was allowed. Kangaroo mother care (KMC) was not practiced at the time as guidelines regarding KMC in coronavirus disease (COVID-19) were not clear.

Data was entered and analyzed on Microsoft Excel.

Of the 423 outborn neonates; 18 (4.25%) tested positive for SARS-CoV-2 by RT-PCR of nasopharyngeal swabs. These included a pair of dichorionic diamniotic twins. Four babies were preterms (youngest weighing 1000 g), and 9 were delivered by caesarian section, with the most common indication being meconium stained liquor. All positive neonates had symptoms warranting neonatal intensive care unit (NICU) admission. Clinical presentation was varied, with respiratory distress being the most common, which could be attributed to neonatal respiratory or cardiac problems. Six babies required ventilation (**Table I**). Fever was the other common symptom, but a focus could not be elicited in any case.

Of interest to note was case 7, first of a pair of twins admitted for meconium aspiration syndrome and late onset *Pseudomonas aeruginosa* sepsis. Baby had persistent thrombocytopenia despite two weeks of appropriate antibiotics treatment, and clearance of bacteria on repeat blood, cerebrospinal fluid, urine and endotracheal cultures. She developed ascites, cholestasis, elevated lactate dehydrogenase (13,700 U/L), deranged coagulation profile and elevated Interleukin-6 (13.58 pg/ mL). She required invasive mechanical ventilation, inotrope support, intravenous immunoglobulin and low molecular weight heparin. Upon retesting, baby continued to show SARS-CoV-2 positivity till day 21, and died on day 28. Multisystem inflammatory syndrome (MIS-C) was suspected in this case [1,2].

Fifteen neonates survived and were discharged home, and three died after 2-28 days of stay. Median (IQR) duration of hospital stay was 10 (9,16) days. Retesting was done as per protocol for 14 babies (remaining three became asymptomatic, and one died). Eight babies were negative on first retest, one on second retest (one succumbed before second) and four continued to be positive after third retest. Of the four babies who continued to test positive, three were critically sick and required ventilation and intensive care stay for more than 2 weeks.

Upon contact-tracing, 9 mothers and 1 caretaker (paternal aunt) were positive. Three of the positive mothers tested negative prior to delivery but tested positive on re-screen. Only one mother was symptomatic with fever. No contact was identifiable in 8 babies which may imply low viral load in the caregivers.

We, herein, highlight the clinico-demographic details and outcomes of SARS-CoV-2 positive neonates presenting to the outborn unit of a tertiary care pediatric hospital. All positive neonates in our study were symptomatic and respiratory symptoms were the most common. Fever was seen in one-sixth, unlike children and adults where fever is a predominant symptom [3-6]. Like older children, the overall prognosis of SARS-CoV-2 infection in neonates is better than adults [3-8], unless they have other co-morbidities e.g., total anomalous pulmonary various connection or polycystic kidney disease with renal failure seen in our series. Though systematic reviews attribute neonatal symptoms to COVID-19, most of our cases had symptoms which could be explained by neonatal illnesses [5].

A limitation of our study was that viral titers were not done. Neonates who remained PCR-positive for a long duration may imply a higher viral load. Although the frequency of SARS-CoV-2-positive neonates is extremely low, a significant proportion of the affected neonates requiring intensive care and mechanical ventilation suggests that the disease in neonates is more severe than older children [3-8], which correlates with our study as well.

Contributors: BS,SR,VD,SP,MB: conceived, designed the study, finalized the manuscript; BS,VD,SR: data collection, data analysis, writing manuscript; BS,VD,SR,SP: data collection, data analysis, managed the babies; BS,VD,SR,SP: Literature search, interpretation of data, writing manuscript.

Ethic clearance: Institutional Ethics Committee- Bai Jerbai Wadia Hospital for Children; No. IEC-BJWHC/88/2020 dated 26 August, 2020.

Funding: None; *Competing interests:* None stated.

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REFERENCES

1. Cook J, Harman K, Zoica B, Verma A, D'Silva P, Gupta A. Horizontal transmission of severe acute respiratory syndrome coronavirus 2 to a premature infant: Multiple organ injury and association with markers of inflammation. *Lancet Child Adolesc Health.* 2020;4:548-51.
2. Corondao A, Nawaratne U, Mcmann D, Ellsworth M, Meliones J, Boukas K. Late-onset neonatal sepsis in a patient with Covid-19. *N Engl J Med.* 2020;382:e49.
3. Castagnoli R, Votto M, Licari A, et al. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection in children and adolescents: A systematic review. *JAMA Pediatr.* 2020;174:882-88.
4. Rodriguez-Morales AJ, Jaime A, Cardona-Ospina, et al. Clinical, laboratory and imaging features of COVID-19: A systematic review and meta-analysis. *Travel Med Infect Dis.* 2020;34:101623.
5. Meena J, Yadav J, Saini L, Yadav A, Kumar J. Clinical features and outcome of SARS-CoV-2 infection in children: A systematic review and meta-analysis. *Indian Pediatr.* 2020;57:820-26.
6. Ludvigsson JF. Systematic review of COVID-19 in children shows milder cases and a better prognosis than adults. *Acta Paediatr.* 2020;109:1088-95.
7. Dong Y, Mo X, Hu Y, et al. Epidemiological characteristics of 2143 pediatric patients with 2019 coronavirus disease in China. *J Emerg Med.* 2020; 58:712-13.
8. Bernado G, Giordano M, Zollo G, et al. The clinical course of SARS-CoV-2 positive neonates. *J Perinatol.* 2020;40:1462-69.

Table I Diagnosis, Treatment and Outcome of SARS-CoV-2 Positive Neonates (N=18)

<i>Characteristics</i>	<i>No. (%)</i>
<i>Diagnosis</i> ^a	
Respiratory distress	5 (27.8)
Meconium aspiration syndrome	3 (16.7)
Respiratory distress syndrome	1 (5.5)
Aspiration pneumonia	1 (5.5)
Fever	3 (16.7)
Seizures (metabolic)	2 (11.1)
Neonatal jaundice	2 (11.1)
<i>Management</i> ^b	
Respiratory management	
Oxygen therapy	1 (5.5)
Non invasive ventilation	2 (11.1)
Invasive ventilation	4 (22.2)
Inotropes	2 (11.1)
Antibiotics	9 (50)
Blood products	3 (16.7)
Intravenous fluids	7 (38.9)
Phototherapy	3 (16.7)
Supportive therapy	4 (22.2)
<i>Outcome</i>	
Length of hospital stay, d ^c	10 (9,16)
Mortality	3 (16.7)

^aFeeding difficulty, Pierre Robin Sequence, Total Anomalous Pulmonary Venous Communication (TAPVC), Hirschsprung's Disease, Polycystic Kidney Disease with Acute Kidney Injury (PKD), Diarrhea; ^bIntravenous immunoglobulin and low molecular weight heparin in one baby. ^cvalues in median (IQR).