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Original Research Article

Symptomatic neonatal SARS-CoV-2 infection in a tertiary care teaching hospital: an observational prospective study

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ABSTRACT

Background: The likelihood of newborns acquiring severe acute respiratory syndrome coronavirus 2 (SARS- CoV-2) from infected mothers has raised concerns among families and clinicians worldwide. The disease seems to be mild in children and, to date; there are few reports in neonatal population. The aim of the study was to study the Prevalence of Neonatal SARS-CoV-2 infection in a tertiary care teaching hospital. The objective of the study was to study correlation of clinical features and laboratory parameters among SARS-CoV-2 positive neonates.
Methods: Prospective observational study conducted in a dedicated COVID-19 tertiary care hospital and Postgraduate Institute in Pune, Maharashtra between May 2020 and August 2020 on a sample size of 55 COVID suspect neonates as they were admitted and diagnosed during the pandemic.
Results: Out of 250 COVID positive mothers admitted, 55 COVID suspect neonates were admitted as their mothers were symptomatic. Among 55 suspect neonates, 11 turned out to be positive (20%). Out of 11 COVID positive neonates, tachypnea with requirement of non-invasive O2 in 2 (18%), feeding intolerance in 2 (18%), fever in 2 (18%) rash 1 (9%) was seen. out of the 11 COVID positive neonates admitted, 45% had elevated D-Dimer levels, 36% had elevated Leucocyte counts, 27% each had raised serum ferritin and fibrinogen levels and 18% had raised CRP Levels.
Conclusions: We conclude that inspite of the first wave of COVID seen in neonates which was rare then, clinical and laboratory markers showed a good co-relation in our study in all neonates who were COVID positive but there was no radiological co-relation in any. However, all recovered with symptomatic treatment without any specific COVID treatment.

Keywords: COVID suspects, COVID positive, Neonate

INTRODUCTION

In December 2019, an emergent new coronavirus was detected in Wuhan, China, as the cause of severe pneumonia. The virus, named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), causes a disease named coronavirus disease (COVID-19) and has become a pandemic.[1] The disease seems to be mild in children and, to date; there are few reports in neonatal population. Many early reports of COVID-19 in pregnancy described management by caesarean, isolation of the neonate from the mother at birth and formula feeding. The reasons included previous experience of the severity of other coronavirus infections in pregnancy as well as an intention to protect the neonate from infection.

It is still not clear if there is vertical transmission of virus from mother to newborn and there is not a consensus on the appropriate infection control precautions to be used in the care of the newborn.[2-4]

With COVID19, there have been instances where the infection in the neonate has been acquired from the mother or caregiver. What data is available suggests that neonates and infants have a "benign" form of the infection even if they were prematurely born or had low birth weight.[3] Despite rapidly evolving knowledge about COVID 19 infection, routes of perinatal COVID 19 transmission and viral load in mother neonate dyad remain uncertain.[5] Hence we decided to take up this project to study the prevalence of Neonatal SARS-CoV-2 infection and to study the correlation of clinical features with laboratory parameters among SARS-CoV-2 positive neonates.

METHODS

This was Prospective observational study conducted in a dedicated COVID-19 Tertiary care hospital and Postgraduate Institute in Pune, Maharashtra between May 2020 and August 2020 during the first Covid wave as we started functioning separate NICU for COVID suspects and COVID positive neonates. Prior approval was taken from the Institutional ethics committee.

A combined oropharyngeal and nasopharyngeal swab specimen in a single viral-transport medium tube were obtained under transmission-based precautions for all neonates under study. However, Covid Antibody levels could not be done on these positive neonates due to financial constraints.

Out of 250 COVID positive mothers admitted, 55 COVID Suspect neonates of symptomatic COVID positive mothers were included in study. An Informed consent of all parents of the concerned neonates was taken on admission. Proforma sheet was filled defining the demographic profile and clinical presentation and the recommended laboratory findings. Stable neonates, whether positive or negative, were roomed-in with their SARS-CoV-2 positive mothers in a separate COVID postnatal ward as recommended by Federation of Obstetric and Gynaecological Societies of India (FOGSI) and National Neonatology Forum (NNF) guidelines on the management of perinatal SARS-CoV-2 infection6. Mothers were encouraged to breastfeed immediately after birth and proper handwashing and hygienic measures were followed. Whenever the neonates showed, symptoms were shifted to NICU.

Symptomatology of all major systems of body was examined to know predilection for particular system. Lab parameters like Ddimer, Ferritin, Fibrinogen, total leukocyte count and CRP were sent to see their correlation with clinical features. Guidelines of Indian Academy of Paediatrics were followed for management of positive neonates. After clinical improvement and normalization of deranged laboratory parameters they were discharged with establishment of feeds.

Inclusion criteria

All COVID suspect neonates of symptomatic COVID positive mothers admitted under our care and turn covid positive on RTPCR test.

Exclusion criteria

COVID negative neonates.

Descriptive statistics were used and outcomes expressed as proportions. Calculations were done using Microsoft Excel software.

RESULTS

Figure 1 depicts prevalence of COVID 19 positive neonates among 55 suspect neonates admitted in our postnatal ward. This shows that 20% were COVID positive neonates and 80% were COVID negative.

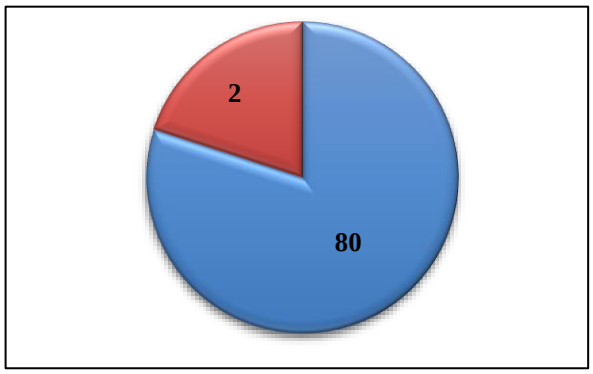

Figure 1: Distribution of neonates according to COVID status.

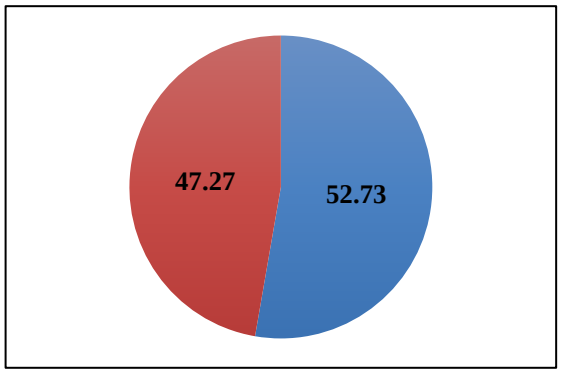

Figure 2: Gender wise distribution of neonates.

Figure 2 depicts Demographic profile of COVID-19 suspect neonate which shows that out of 55 COVID suspect neonates born to COVID positive mothers, males (52.73%) outnumbered females (47.27%).

(Figure 3) Symptomatology of COVID 19 positive neonates admitted in the postnatal ward showed that out of 11 COVID positive neonates admitted in our NICU, 18 % of each had fever, required O2 support, feed intolerance with lethargy, tachypnoea and 9% had rash with some bleeding tendency.

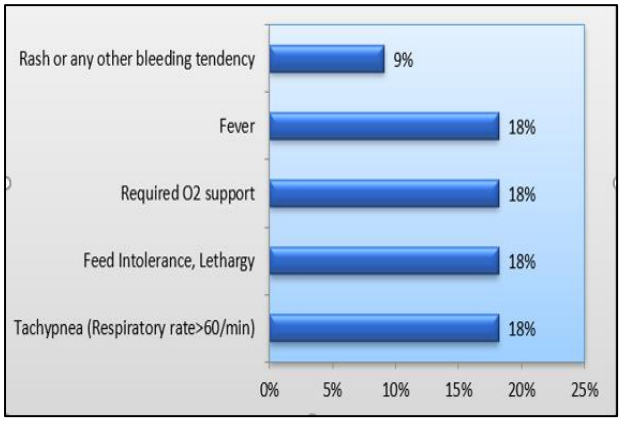

Figure 3: Clinical presentation distribution.

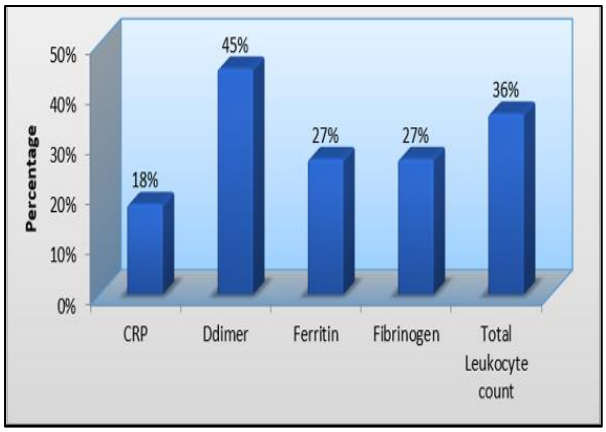

Figure 4: Lab parameters distribution.

Figure 4 depicts out of the 11 COVID positive neonates admitted, 45% had elevated D-Dimer levels, 36% had elevated leucocyte counts, 27 % each had raised serum ferritin and fibrinogen levels and 18 % had raised CRP levels. These findings are consistent with the clinical presentation of neonatal COVID.

DISCUSSION

Out of 250 COVID positive mothers admitted in Obstetrics and Gynaecology department in our hospital, 55 COVID suspect neonates were under postnatal care under us as their mothers were symptomatic. Among 55 suspect neonates, 11 neonates (20%) turned out to be RTPCR positive and symptomatic, hence shifted to the NICU. The rest were negative and roomed in with the positive mothers in postnatal ward following all the guidelines.[7]

In our study, the maternal reports were available after 24 to 48 hours of delivery. Hence many neonates were tested at 48 hours to 72 hours and two neonates were tested between 7-10 days who detiorated later. Horizontal transmission from unknown sources cannot be ruled out in these neonates similar to study by James cook et al.[7] Most of the cohort studies reported so far in neonates has reported mild symptoms in neonates. Common symptoms reported include respiratory distress, fever, and those related to gastrointestinal illness.[8] Out of the 11 COVID positive neonates in our study, tachypnea with requirement of non-invasive O2 was seen in 2 neonates (18%) who responded to continuous positive pressure oxygen in 48 hours and were maintaining saturation later on room air after weaning off. Feeding intolerance was seen in 2 (18%), fever in 2 (18%), rash was seen in one neonate only (9%). Above findings collaborate with the findings of Kalamdani et al but they did not report any rash as presenting feature.[9]

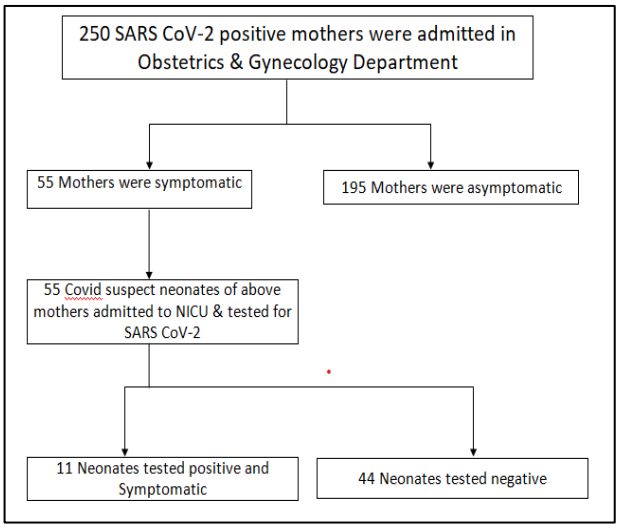

Figure 5: Flow diagram of the COVID positive mothers and neonate admission.

Very few studies have described laboratory abnormalities in SARS-CoV-2 positive neonates. In a case series by Hu Z et al of 24 asymptomatic infections, four (16.7%) cases had lymphopenia and other four had leukopenia Zimmermann et al noted that the white blood cell count is typically normal or reduced with decreased neutrophil and/or lymphocyte counts.[9] In our study, marked elevation of d-dimer (45%), Serum ferritin and Fibrinogen in 27% each and leucopenia (36%) were observed in the SARS-CoV-2 positive neonates and all of them recovered without any specific treatment.[8] De Bernardo, et al has reported radiological abnormalities in 44% of SARS-CoV2 positive neonates but we did not find any radiological abnormalities in our study.[10]

There is no conclusive evidence that the virus is transmitted through breastmilk.[11,12] Also, the benefits of breastfeeding far outweigh the negligible risk of transmitting the virus. In our center, we counselled and

encouraged mothers to follow strict hand hygiene and respiratory hygiene all the time, especially while breastfeeding, but the exact compliance was not studied.[13,14] Routine newborn criteria, including stable physical exam, ability to maintain body temperature, and feeding well with adequate hydration, were used to establish timing of discharge.[15]

Limitations

We hypothesised a few reasons for the low rates of early-onset neonatal COVID-19 infections. First, ACE2 expression in the placenta is low. Second, all newborns and their mothers may not undergo RT- PCR tests due to resource limitations or if the mothers were asymptomatic. hence the possibility of vertical intrauterine transmission is not ruled out. Hence, the overall incidence could be higher than what we estimated.

CONCLUSION

We conclude that inspite of the first wave of COVID seen in neonates which was rare then, there was 20% prevalence and the clinical and laboratory markers showed a good co-relation in our study in all neonates who were COVID positive but there was no radiological co-relation in any. However all recovered with symptomatic treatment without any specific COVID treatment.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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