

## RISK OF VERTICAL TRANSMISSION AND HEALTH PROFILE OF NEWBORNS BORN TO COVID-19 POSITIVE MOTHER'S - A RETROSPECTIVE ANALYSIS

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### Abstract

**Background:** COVID-19 was declared as a pandemic by World Health Organization (WHO) on March 10th, 2020. During previous pandemics, there were reported cases of spontaneous abortions, preterm delivery, low birth weight, and birth defects. The risk of vertical and perinatal transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2, which causes COVID-19), the most appropriate management, and the neonate's risk of developing COVID-19 during the perinatal period are unknown. Hence this study aims to attempt answering the above questions with objectives to estimate the risk of neonatal COVID-19 infection in newborns born to COVID-19 positive mothers and to assess the health profile of newborns born to COVID-19 positive mothers. **Materials and Methods:** A retrospective observational study was done in ESIC hospital, Gulbarga during period from 1st June to 20th September 2020. Newborns born to the mothers who were detected positive for COVID-19 infection either by RT-PCR or RAT within 14 days of delivery were included in this study. After having obtained an informed consent, detailed history, examination findings were documented using a structured proforma and RT-PCR for COVID 19 was done in all newborns within 7 days of life. **Result:** A total of 35 COVID-19 infected pregnant mothers were reported. One of the mothers died from COVID-19 related respiratory complications antenatally. One was still born and two were intrauterine death (IUD). 4 neonates were positive for COVID-19 infection among 31 newborns detected by nasopharyngeal swab for RT-PCR. Among 4 positive two had respiratory symptoms of which one neonatal death seen. Currently based on limited data, there is 12.9% evidence for perinatal transmission of COVID 19 from infected pregnant woman to their fetuses. **Conclusion:** Data from above study suggests perinatal transmission of SARS-CoV 2 infection and increased morbidity and mortality in infected infants.

## INTRODUCTION

COVID-19 pneumonia was first reported in Wuhan, Hubei Province, China, in December, 2019, followed by an outbreak across Hubei Province and other parts of the china and then spread to the whole world. World Health Organization (WHO) declared COVID-19 as a pandemic on March 10th, 2020.<sup>[1,2]</sup> It did not take long for the COVID-19 to establish its roots in India as the first case was confirmed on 30th January and the first death due to COVID-19 infection occurred in Kalaburagi district of Karnataka on 11<sup>th</sup> March 2020.<sup>[3,4]</sup>

It was expected that newborns were at high risk for COVID-19-related complications because of their immune characteristics and their physiological changes in cardiovascular and respiratory system at birth.<sup>[5]</sup> During previous pandemics, there were reported cases of spontaneous abortions, preterm delivery, low birth weight, and birth defects.<sup>[6,7]</sup> Some studies show lack of vertical transmission of COVID-19,<sup>[8]</sup> while others have documented the possible transmission of covid-19 infection from mother to the newborn.<sup>[9]</sup> However, these studies were conducted on small samples and leave many questions unanswered.

The risk of vertical and perinatal transmission of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2, which causes COVID-19), the most appropriate management, and the neonate's risk of developing COVID-19 during the perinatal period are unknown. Hence this study aims to attempt answering the above questions.

Recently at the end of 2019, Wuhan an emerging business hub of China experienced an outbreak of a novel coronavirus that later turned into a major pandemic. This virus was reported to be a member of the  $\beta$  group of coronaviruses. The novel virus was named as Wuhan coronavirus or 2019 novel coronavirus (2019-nCov) by the Chinese researchers. The International Committee on Taxonomy of Viruses (ICTV) named the virus as SARS-CoV-2 and the disease as COVID-19.<sup>[10-12]</sup>

COVID-19 is transmitted by close person-to-person contact through contact of the mucus membranes of the respiratory tract with respiratory droplets formed when an infected person coughs or sneezes. Faecal-oral transmission and transmission via fomites have also been reported.<sup>[13]</sup>

Respiratory viruses uncommonly result in intrauterine transmission of infection to fetuses; therefore, intrauterine transmission of SARS-CoV-2 is anticipated to be low. Two case reports describing isolation of SARS-CoV-2 from amniotic fluid and placental tissue and isolation of SARS-CoV-2 from the nasopharynx of the two neonates within 48 hours of life suggested probable congenital infection.<sup>[14,15]</sup>

### Objectives

1. To estimate the risk of neonatal COVID-19 infection in newborns born to COVID-19 positive mothers.
2. To assess the health profile of newborns born to COVID-19 positive mothers

## MATERIALS AND METHODS

The study was conducted after approval by the Institutional Ethics Committee at ESIC Medical College and Hospital, Gulbarga, Karnataka.

**Study Design:** Retrospective observational study

**Data collection Period:** 1st June to 30th September 2020

**Study population:** All Newborns born at ESIC Medical College Gulbarga Karnataka India during the period from June 2020 to September 2020.

**Selection criteria:** Newborns born to the mothers who were detected positive for COVID-19 infection either by RT-PCR or RAT within 14 days of delivery at ESIC Medical College Kalaburagi, Karnataka, India during the period from June 2020 to September 2020 will be considered for the study.

Selected newborns were tested for COVID-19 infection by RT-PCR test done on nasopharyngeal swab collected within 7 days of life.

### Exclusion criteria

Out born babies admitted to our NICU/Post-natal ward were excluded.

Newborns born to mothers who were COVID-19 positive before 14 days of delivery or diagnosed COVID-19 after 7 days delivery were excluded

**Data collection:** The data were collected by a pretested, pre validated proforma from the in-patient department files admitted from 1st June 2020 to 30th September 2020 from medical records department (MRD).

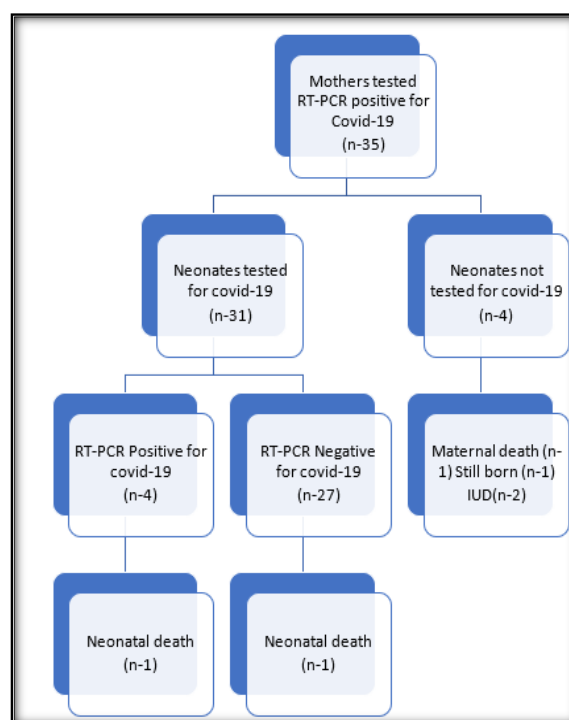
**Statistical Analysis:** Categorical variables were expressed as percentage and continuous variables were expressed as mean value  $\pm$  (standard deviation). A p-value of  $< 0.05$  was considered as significant. All statistical analysis was performed using IBM SPSS 21 version.

## RESULTS

Out of 32 newborns born, males and females were 16 each with a sex ratio of 1:1. Out of 32 babies born 9 (28.12%) were SGA (small of gestation) and 23 (71.87%) were AGA (appropriate for gestation).

Out of 32 babies born 6 (18.75%) babies were LBW (birth weight less than 2500gm) and 2 (6.25%) were VLBW (birth weight less than 1500gm) with average birth weight of 2789 grams  $\pm$ 100grams. (Table no 1)

Out of 32 newborns 2(6.25%) were preterm and 30(93.7%) were term babies with average gestational age of 38.18 weeks. Out of 34 deliveries conducted, 16(47.1%) were vaginal deliveries and 18(52.9%) LSCS.



**Figure 1: Study profile regarding the transmission of COVID-19 infection from mother to neonates RT-PCR: Real-time reverse transcriptase-polymerase chain reaction; IUD: intrauterine death**

A total of 35 COVID-19 infected pregnant mothers were reported. 1 mother died due to COVID-19 related respiratory complications antenatally before delivery. 2 (5.71%) had intrauterine deaths and 1 (2.85%) was still born. 31 new-born's were tested for nasopharyngeal swab for RT-PCR, out of which 4 had the test positive (12.9%) with 1 (25%) preterm neonatal death and 27 were tested negative (87.09%) with 1 (3.7%) neonatal death. [Figure 1]

Out of 32 babies, 7 (21.87%) babies required respiratory support - 2 by ventilator, 4 by oxygen hood and 1 required extensive neonatal resuscitation and could not be revived.

Currently based on limited data the present study, there is 5% evidence for perinatal transmission of COVID 19 from infected pregnant woman to their babies. Amongst symptomatic neonates, most morbidities were related to IUGR/ prematurity.

**Table 1: Baseline characteristics of newborn enrolled in the study.**

No of new-born's	Demographics		
32	Sex		
	Male (n=16) (50%)	Female(n=16) (50%)	
32	Gestational Age		
	Term(n=30) (93.7%)	Preterm(n=2) (6.25%)	
34	Mode of Delivery		
	Vaginal delivery (n=16) (47.1%)	LSCS(n=18) (52.9%)	
32	Birth weight (Avg = 2789 grams)		
	>2500 gms(n=24)(75%)	LBW(n=6)(18.75%)	VLBW(n=2)(6.25%)
32	Type of newborn		
	AGA(n=23) (71.87%)	SGA(n=9) (28.12%)	

LSCS: Lower segment caesarean section; LBW: Low birth weight; VLBW: Very low birth weight; AGA: Appropriate for Gestational age; SGA: Small for gestational age.

## DISCUSSION

Our study showed 5% perinatal transmission of COVID-19 comparable with 8% in More K et al.<sup>[16]</sup> In this study, all COVID-19-positive mothers gave birth to a single-term fetus, and there are no stillbirths in our study.

In our study of 31 newborns, four were positive for COVID-19. Thus, the overall infection rate was 12.9% for the neonates born to COVID-19-positive mothers. The study from Puducherry, shows that the vertical transmission rate is 6.12%, which is much lower than that in our study, but our study was conducted in a smaller population compared to that in the Puducherry study.<sup>[17]</sup>

It was even lower in the study conducted by Rozycki HJ et al,<sup>[18]</sup> where only 3.1% of new-borns born to mothers with COVID-19, tested positive for SARS-CoV-2 but none died due to COVID-19. The average birth weight in our study was 2789 grams  $\pm$ 100grams which is comparable with the study conducted in Mumbai where average birth weight was between 2.5kg to 2.9kg.<sup>[19]</sup> Our study showed percentage involvement of low birth weight (18.75%) and premature birth (6.25%) as compared to low birth weight (13.9%) and premature birth (22.2%) found in study conducted by Do-Hyan et al.<sup>[20]</sup>

### Limitations:

1. Sample size was small and long term follow up of the outcome of the new-born's was not possible.
2. Controls were not taken into consideration

## CONCLUSION

Data from above study suggests perinatal transmission of SARS-CoV 2 infection and increased morbidity and mortality in infected infants.

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