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## Original Research Article

## A study on preterm births and neonatal outcomes during second wave of COVID-19

Navya Velishetty<sup>1,\*</sup>, Janaki Vellanki<sup>1</sup>Dept. of Obstetrics & Gynaecology, Gandhi Medical College, Secunderabad, Telangana, India

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## ABSTRACT

**Background:** Pregnant women were considered as high risk group for COVID-19 disease. Occurrence of SARS-Co V 2 infection during pregnancy increased risk of adverse birth outcomes, including preterm births but the evidence for the same is limited.

**Aim:** To study the preterm and very preterm births and their neonatal outcomes in mothers infected with COVID-19 during the second wave of pandemic.

**Objectives:** 1. To study the preterm and very preterm births in COVID-19 pregnant women during the second wave. 2. To determine whether any additional risk is conferred by maternal pre existing medical conditions including chronic and gestational hypertension, diabetes and obesity for neonatal adverse outcomes.

**Materials and Methods:** All pregnant women infected with COVID-19 delivering before 37 weeks during the second wave were studied.

Neonatal outcomes of the preterm and very preterm births were analyzed based on the birth weight, gestational age, APGAR score, NICU admissions and NICU deaths. All the findings were analyzed using descriptive statistics.

**Results:** During this study, out of 500 pregnant women with COVID-19 infection, 61.2% (306) women delivered preterm. Of all preterm births, low birth weight was seen in 213 cases (69.6%) & 92(30%) babies were admitted in NICU. Preterm births were observed to be increased during the second wave of COVID-19.

**Conclusion:** Pregnant women infected with SARS- Co V 2 are at increased risk for preterm and very preterm births & higher occurrence of NICU admissions were noted.

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## 1. Introduction

Severe Acute Respiratory Syndrome Corona virus 2 (SARS-CoV-2) is a novel beta Co V causing highly contagious viral illness- corona virus disease 2019 (COVID 19), catastrophically affecting world's demography and causing most consequential crisis of global health since 1918, an influenza pandemic era.<sup>1,2</sup>

The first case of COVID-19 was reported in Wuhan, Hubei Province, China in late December 2019.<sup>3</sup> Since then COVID-19 has rapidly disseminated worldwide<sup>4</sup> and overwhelmed entire healthcare systems and has been declared as 5<sup>th</sup> global pandemic on March 11, 2020.

Based on the outbreak of COVID-19 cases, its occurrence till date can be labelled into 2 waves. First wave emerged from April 2020 to February 2021 & the second wave from March 2021 to August 2021.

Transmission of SARS-CoV-2 is primarily by exposure to respiratory droplets contaminated with virus or close

\* Corresponding author.

E-mail address: [navyavelishetty@gmail.com](mailto:navyavelishetty@gmail.com) (N. Velishetty).

contact from infected individuals who are either pre symptomatic, asymptomatic or symptomatic.

5.1 days is the median incubation period for COVID-19 infection and within 11.5 days of contracting infection, the majority of patients do develop symptoms.<sup>1,5</sup>

Clinical spectrum ranges from asymptomatic or pauci symptomatic to acute respiratory failure which requires mechanical ventilation, septic shock and multiple organ failure.<sup>6,7</sup>

Preterm births were labelled as leading cause for morbidity and mortality during perinatal period.<sup>4</sup>

WHO defines preterm as babies born alive prior to 37 completed weeks of pregnancy. Preterm is sub categorised based on gestational age as

1. Extremely preterm (<28 weeks)
2. Very preterm (28 – 32 weeks)
3. Moderate to late preterm (32 – 37 weeks)

Most of the preterm births happen spontaneously, but some maybe due to early induction or caesarean delivery, for any medical or non- medical reasons.

Most common causes of preterm births are infections, multiple pregnancy, chronic illnesses like high blood pressure and diabetes, however, usually no cause is identified.<sup>8</sup>

Emergence of COVID-19 pandemic led to compromised maternal & child health due to lack of knowledge about the disease.

Adverse pregnancy outcomes like preterm birth, fetal growth restriction and perinatal mortality could be expected in COVID 19 infected mothers.<sup>9</sup>

## 2. Aims and Objectives

Data from all preterm births occurring at our hospital between March 2021 and august 2021 (second wave of COVID-19) was collected,

1. To study the neonatal outcomes in the preterm and very preterm births in mothers infected with COVID-19 during the second wave of pandemic.
2. To determine whether any additional risk is conferred by maternal pre existing medical conditions including chronic and gestational hypertension, diabetes and obesity for neonatal adverse outcomes.

## 3. Materials and Methods

This prospective analytical study includes all births occurring prior to 37 completed weeks of gestational age in COVID-19 infected pregnant women between March 2021 and August 2021 at our hospital, which is a nodal centre for our state allotted exclusively for COVID-19 positive patients.

A total of 500 pregnant women who were tested positive for COVID-19 delivered during the second wave of the

COVID-19 pandemic between March 2021 and August 2021, of which 306 delivered very preterm or preterm and were included in the study.

### 3.1. Inclusion criteria

1. All COVID-19 positive pregnant women admitted at our tertiary care centre who delivered before 37 completed weeks of gestational age.
2. All the preterm and very preterm births of pregnant women tested positive for COVID-19 and who delivered vaginally or through Caesarean section.

### 3.2. Exclusion criteria

1. All women who were tested negative for COVID-19.
2. All COVID-19 positive pregnant women who delivered after 37 completed weeks of gestational age.

## 4. Results

**Table 1:** Incidence of preterm and very preterm deliveries

| Gestational age at the time of delivery in weeks | No. of cases (out of 306) | Percentage of cases (%) |
|--|---------------------------|-------------------------|
| 28-32 weeks                                      | 13                        | 4%                      |
| 32-37 completed weeks                            | 293                       | 96%                     |

It is observed that preterm births were high when compared to very preterm births.

According to a large study by researchers at UC San Francisco, among COVID-19 infected pregnant women, preterm birth rate was 11.8% as compared to 8.7% among those not infected with COVID-19.<sup>10</sup> Highest rate of VPTB was seen in Asian pregnant women with COVID -19infection.<sup>11</sup> Risk of VPTB and PTB was elevated in birthing women with hypertension, diabetes or obesity and COVID-19 infection.<sup>10</sup>

In contrary, another study showed that preterm births were decreased during COVID-19.<sup>12,13</sup>

**Table 2:** Maternal medical complications

| Associated medical complications | No. of cases (out of 306) | Percentage of cases (%) |
|----------------------------------|---------------------------|-------------------------|
| Gestational hypertension         | 16                        | 5%                      |
| Pre eclampsia                    | 52                        | 17%                     |
| Eclampsia                        | 15                        | 5%                      |
| HELLP                            | 20                        | 6%                      |
| Diabetes                         | 51                        | 16%                     |
| Asthma                           | 24                        | 8%                      |
| Sepsis                           | 13                        | 4%                      |
| Respiratory distress             | 101                       | 33%                     |

**Table 6:** Neonatal outcomes

| Neonatal complications                | No. of cases (out of 306) |
|---------------------------------------|---------------------------|
| APGAR <7 after 10 minutes             | 120                       |
| Neonates who were intubated           | 84                        |
| NICU admissions                       | 92                        |
| Neonatal deaths                       | 16                        |
| Neonates tested positive for covid-19 | 12                        |

It is observed in our study that preterm births were seen in 101 cases with respiratory distress, 52 cases with preeclampsia, 51 cases with diabetes.

The above findings were in comparison with multinational cohort study by Jose Villardamong on maternal and neonatal mortality and morbidity in pregnant women with COVID-19. 2130 pregnant women were studied in whom presence of preeclampsia or other medical complications were associated with increased maternal and fetal morbidity and mortality.<sup>14</sup>

**Table 3:** Mode of delivery

|                      | No. of cases (out of 306) | Percentage of cases (%) |
|----------------------|---------------------------|-------------------------|
| Spontaneous delivery | 128                       | 42                      |
| Induced delivery     | 178                       | 58                      |

International multicenter cohort study, Villar et al. found that COVID-19 diagnosis increased preterm births by 59%, driven primarily by medically indicated rather than spontaneous preterm births.<sup>15</sup>

**Table 4:** Indications for induction of delivery

| Indications for induced delivery | No. of cases (out of 306) | Percentage of cases (%) |
|----------------------------------|---------------------------|-------------------------|
| PPROM                            | 48                        | 16%                     |
| Severe IUGR                      | 30                        | 10%                     |
| Abruption                        | 15                        | 5%                      |
| Fetal distress                   | 28                        | 9%                      |
| Maternal respiratory failure     | 101                       | 33%                     |
| Other causes                     | 84                        | 27%                     |

**Table 5:** Birth weights of the preterm and very preterm babies

| Birth weight in kilograms | No. of cases (out of 306) | Percentage of cases (%) |
|---------------------------|---------------------------|-------------------------|
| 1 -1.5                    | 20                        | 7                       |
| 1.5-2                     | 61                        | 20                      |
| 2-2.5                     | 132                       | 43                      |
| >2.5                      | 93                        | 30                      |

WHO defines low birth weight as being <2.5kg.<sup>8</sup>

Low birth weights and very low birth weights are commonly associated with preterm births.

## 5. Conclusion

Pregnant women infected with SARS- Co V 2 are at increased risk for preterm and very preterm births & higher occurrence of NICU admissions were noted. Most of the preterm and very preterm births were induced for medical complications due to or in association with COVID-19.

## 6. Interpretation

These findings underscore importance to adopt an equity strategy to address the systems and structures to optimize access and utilize care to mitigate COVID-19 infection onset and/or its severity and adverse birth outcomes.

Timely reporting is essential to target COVID-19 treatment and its prevention, as well as to consider informed decision making regarding vaccination choices, management strategies and allocation of resources.

## 7. Source of Funding

None.

## 8. Conflict of Interest

The authors declare no conflict of interest.

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### Author biography

**Navya Velishetty**, Post Graduate  <https://orcid.org/0000-0001-7587-0121>

**Janaki Vellanki**, Professor

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