

# Labor Outcomes in COVID-19-Positive Pregnant Women and Possibility of COVID-19 Maternal-Fetal Transmission during COVID-19 Wave-1 in COVID-19 Designated Hospital

AdityaSapra<sup>1</sup>, Pruthviraj<sup>2</sup>, JagadeeswaranVU<sup>3</sup>, Madhusudhana HN<sup>4</sup>

## ABSTRACT

**Introduction:** Despite the rapidevolution of COVID-19 disease worldwide, the transmission of COVID-19 infection from COVID-19-positive pregnant women to neonates remain undetermined. The present study sought to investigate the labor outcomes in COVID-19-positive pregnant women who delivered neonates via vaginal delivery or caesarean section, as well as COVID-19 maternal-fetal transmission during COVID-19 Wave-1 in COVID-19 designated hospital.

**Material and methods:** This was a single-center, prospective, observational study conducted at COVID-19 designated hospital from March, 2020 to December, 2020. The study included 25 COVID-19-positive pregnant women and 25 neonates. COVID-19 infection was confirmed using rapid antigen test or real time reverse transcription-polymerase chain reaction (RT-PCR) in maternal and neonatal specimens.

**Result:** Among these 25 COVID-19-positive pregnant women (mean age: 29.64 ± 3.29 years), 9 (36%) of the pregnant women were primigravidas and 16 (64%) were multigravidas. Majority of the COVID-19-positive pregnant women (68%) underwent normal vaginal delivery, followed by emergency LSCS (28%), and elective LSCS (4%). O-positive blood group was the most prevailed blood groups (44%) in the study population, followed by B-positive (24%) and A-positive blood group (16%). All the neonates were breastfed. None of the mother and their neonates were admitted in the intensive care unit. All the neonates born to COVID-19-positive pregnant women were found COVID-19-negative. No maternal to fetal transmission was noted.

**Conclusion:** No evidence of transmission of COVID-19 infection from COVID-19-positive pregnant women to neonates was found in the study.

**Keywords:** COVID-19; Delivery; Labor; Maternal-Fetal Transmission; Pregnant Women

to COVID-19 infection. This may raise the likelihood of unfavorable pregnancy outcomes.<sup>5,6</sup> The probability of SARS-CoV-2 transmission through placenta may result in negative neonatal outcomes has yet to be confirmed<sup>7,8</sup>, albeit the reports of COVID-19 infections in newborns.<sup>9-14</sup> Taking into account of the controversial data about the period of COVID-19 in pregnant women and neonates<sup>13-17</sup>, the present study aimed to evaluate the outcomes of labor in COVID-19-positive pregnant women who delivered neonates via vaginal delivery or caesarean section, as well as COVID-19 maternal-fetal transmission during COVID-19 Wave-1 in COVID-19 designated hospital.

## Methods

A single-center, retrospective observational study was conducted at our hospital from March, 2020 to December, 2020. During this period, the hospital has been pronounced as a COVID-19 designated hospital for the entitled patients. The following three separate designated areas were assigned for pregnant women: 1) for pregnant women with confirmed COVID-19, 2) for pregnant women with suspected COVID-19, and 3) for non-COVID-19 pregnant women. Out of 500 pregnant women, 25 pregnant women with laboratory-confirmed COVID-19 were consecutively included in the study. All the pregnant women who were suspected to have COVID-19 or negative COVID-19 results were excluded from the study. The study was approved by the hospital ethics committee. Written informed consent was obtained from patients prior to their enrolment in the study. Nasal and throat swabs were taken for the laboratory diagnosis of the COVID-19 infection. The samples were collected, processed and analysed at the hospital's laboratory. Rapid antigen test was performed on the pregnant women in active labor, whereas the real-time reverse transcription-polymerase chain reaction (RT-PCR) was performed on the

## INTRODUCTION

In December 2019, a highly contagious disease caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) designated as "COVID-19", was discovered in Wuhan, Hubei Province, China and has rapidly spread around the world.<sup>1</sup> As of July 22, 2021, there are more than 190 million reported cases of COVID-19 and more than four million deaths globally.<sup>2</sup> Pregnancy, itself an immunosuppressant condition, is linked to COVID-19 infection in terms of immunological dysfunctions such as lymphopenia and increase in certain inflammatory markers.<sup>3,4</sup> Moreover, during pregnancy, lower lung volume due to increase in uterus size and higher oxygen consumption renders pregnant women more prone

<sup>1</sup>Department of of Anaesthesia, 7 Air Force Hospital, Kanpur, <sup>2</sup>Department of of OBG, 7 Air Force Hospital, Kanpur, <sup>3</sup>Department of of ENT, 7 Air Force Hospital, Kanpur, <sup>4</sup>Assistant Professor, Department of Anaesthesia, 7 Air Force Hospital, Kanpur, India

**Corresponding author:** Dr Madhusudana HN, MBBS, MD, Assistant Professor, Department of Anaesthesia, 7 Air Force Hospital, Kanpur, 7839196627, India

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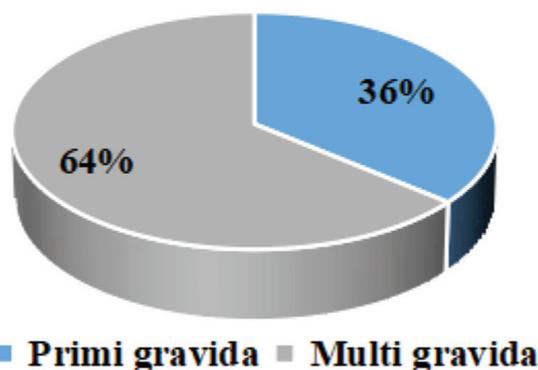
pregnant women presenting any signs of flu-like illness. Pregnant women with confirmed COVID-19 was defined by positive results of rapid antigen test or real time RT-PCR in maternal specimen. Information regarding age, parity, modes of delivery, and blood groups were collected. Patients with active COVID-19 infection were admitted to the isolation unit after delivery. All the neonates were kept under observation and their samples were collected for the diagnosis of COVID-19 infection.

Continuous variables are presented as mean ± SD, and categorical variables are presented as frequency and percentage (%).

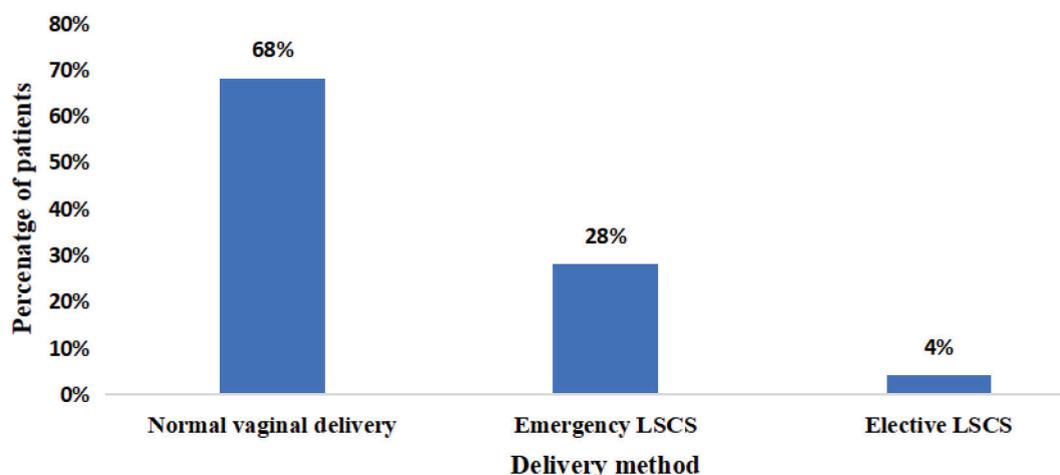
**RESULTS**

The mean of the study population was 29.64 ± 3.29 years. As illustrated in Figure 1, 9 (36%) of the pregnant women diagnosed with COVID-19 were primigravida and 16 (64%) were multigravida.

Distribution of different delivery methods in COVID-19-positive pregnant women were depicted in Figure 2. Normal vaginal delivery was performed in 17 (68%) COVID-19-positive pregnant women, emergency lower segmental caesarean section (LSCS) in 7 (28%), and elective LSCS



**Figure-1:** Distribution of different parities in COVID-19-positive pregnant women  
Data are presented as n (%)



**Figure-2:** Distribution of different delivery methods in COVID-19-positive pregnant women  
‡ LSCS: lower segmental caesarean section  
Data are presented as n (%)

Blood groups	N=25
A positive	4 (16%)
B positive	6 (24%)
O positive	11 (44%)
AB positive	1 (4%)
A negative	0 (0%)
B negative	2 (8%)
O negative	0 (0%)
AB negative	1(4%)
Data are presented as n (%).	
<b>Table-1:</b> Distribution of different blood groups in COVID-19-positive pregnant women	

delivery in 1(4%) COVID-19-positive pregnant women; none of the women had assisted delivery.

Majority of the women had O-positive blood group (44%), followed by B-positive blood group (24%) and A-positive blood group (16%) (Table 1). All the neonates were breast fed, none of the mother and their neonates were admitted in the intensive care unit (ICU). Neonates were found COVID-19-negative. No maternal to fetal transmission was noted.

**DISCUSSION**

We presented clinical data of 25 pregnant women with laboratory-confirmed COVID-19. This observational study found that (1) Multigravida parity was prevailed in the study population; (2) Normal vaginal delivery was the most common delivery method; (3) Most of the COVID-19-positive pregnant women had O-positive blood group; (4) None of the mother and their neonates were admitted to the ICU and all neonates were breast fed; (5) However, all the mothers were COVID-19 positive, their neonates were found negative to COVID-19 infection.

On examining the outcomes, it was noted that the majority (64%) of pregnant women with COVID-19 were multigravidas. This result is in contrast to the study by Wu et al.<sup>18</sup>, who found the primigravida women (82.8%) were prevailed. Another important finding of our study was that most of the pregnant women with COVID-19 had O-

positive blood group (44%), which is similar with Bueno et al.<sup>19</sup> (41.6%) and Ibrahim et al.<sup>20</sup> (52.2%). Our findings were in contrast with findings of Ahmed et al.<sup>21</sup>, which revealed that maximum number of COVID-19-positive pregnant women had A-positive blood group. Owing to the different distribution of blood groups and parity reported in the previous studies, the present study emphasizes the importance of estimation of blood groups and parity in the COVID-19 pregnant women and its association with COVID-19 infection.

In the present study, we found that approximately two-third (68%) of the COVID-19-positive pregnant women underwent vaginal delivery. Only seven COVID-19-positive pregnant women (28%) underwent emergency LSCS and one COVID-19-positive pregnant women (4%) had elective LSCS while inducing labor pain. Labor induction does not raise the likelihood of cesarean section in COVID-19-positive pregnant women. Similarly, Griffin et al.<sup>22</sup> found the incidence of vaginal delivery in 51.9% COVID-19-positive pregnant women, emergent caesarean section in 7.4%, primary caesarean section in 11.1%, and had repeated caesarean section in 18.5% COVID-19-positive pregnant women. In contrast to our findings, Wu et al.<sup>18</sup> and Yan et al.<sup>23</sup> had found the high incidence of cesarean section delivery in COVID-19-positive pregnant women. The study also found no mortality rate between vaginal delivery and cesarean section. Contrast to our study, based on WHO report, the risks of mortality during vaginal delivery (18.36%) were found to be similar in cesarean section (19.57%) in COVID-19-positive pregnant women.<sup>24</sup> Another study have found that the cesarean delivery was linked to higher morbidity than vaginal delivery (adjusted odds ratio 2.1, 95% CI 1.7–2.6) in the early postpartum period due to elevated risks of thromboembolic disease, blood loss, and infections.<sup>25</sup> Nonetheless, it is still unknown which delivery mode is superior for impeding maternal to fetal transmission from pregnant women with COVID-19 to neonates.

Maternal to fetal transmission of respiratory viruses chiefly takes place via close contact, transmission by droplets (among health professionals, family members, and family visitors), nosocomial infections, and subject to infectious sources in public locations. Vertical transmission is defined as movement of pathogen from mother to neonates during prenatal and postnatal periods. It comprises particularly transmission of pathogens via following ways: a) germ cells or placental blood during pregnancy, b) the birth canal during labor and delivery, and c) during postpartum breastfeeding.<sup>15</sup> As the investigation of biological features and pathogenic mechanism of COVID-19 virus has been currently exploring, there is still a dilemma whether COVID-19 virus can be passed from mother to neonates. The present study found that all neonates born to COVID-19-positive pregnant women were COVID-19-negative, which indicates no evidence of maternal to fetal transmission, as previously reported in several studies.<sup>15-17</sup> In contrast to this finding, several observational studies found the possibility of maternal to fetal transmission of COVID-19 infection in neonates.<sup>18,9-14</sup>

The present study also noted that all neonates were breast fed, as well as none of the mother and their neonates were admitted to the ICU. Further studies with large sample size are warranted to determine the risk of maternal to fetal transmission of COVID-19 infection.

As anticipated, there were some discrepancies in the present study. Firstly, it was a single-center study with small sample size, so the data is not representative for the general population. Secondly, no data investigation of laboratory findings, obstetrics and perinatal data was performed. Thirdly, the study didn't evaluate which delivery mode is superior for preventing maternal to fetal transmission of COVID-19 infection.

## CONCLUSION

Taken together, the present study found no evidence of transmission of COVID-19 infection from COVID-19-positive pregnant women to neonates. We advocate systemic testing of any suspected COVID-19 infection during pregnancy and investigation of maternal to fetal transmission in a large sample size due to the pathogenic potential of COVID-19 to produce severe maternal or perinatal adverse effects.

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