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**Dr. Rumana Masudi**
MD, Department of Gynae and Obstetrics, Skims Medical College and Hospital Bemina Srinagar, Jammu and Kashmir, India

**Dr. Sami Jan**
Consultant, Department of Gynae and Obstetrics, Skims Medical College and Hospital Bemina Srinagar, Jammu and Kashmir, India

**Dr. Anjum Malik**
Consultant Associate Professor, Department of Gynae and Obstetrics, Skims Medical College and Hospital Bemina Srinagar, Jammu and Kashmir, India

**Corresponding Author:**
**Dr. Rumana Masudi**
MD, Department of Gynae and Obstetrics, Skims Medical College and Hospital Bemina Srinagar, Jammu and Kashmir, India

# Pregnancy outcome in COVID positive pregnant patients and risk of intrapartum maternal to fetal transmission of COVID-19 during birth: An observational study

**Dr. Rumana Masudi, Dr. Sami Jan and Dr. Anjum Malik**

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**Abstract**
**Objective:** We conducted a study on lab confirmed COVID 19 positive pregnant women who delivered babies through vaginal route and caesarean section and intrapartum maternofetal transmission of COVID-19 during birth was studied.
**Materials and Methods:** An observation- al study was conducted in a covid designated tertiary care hospital in Srinagar, India on a total number of 249 pregnant patients and 130 neonates were included. COVID-19 infection was con- firmed using reverse transcriptase real-time PCR on specimens of respiratory tract (nasal and pharyngeal swabs) of pregnant patients on admission and of all neonates within 48hours of birth.
**Results:** Out of the total 249 COVID positive pregnant patients, 105 patients were discharged from the hospital after they turned out to be COVID negative on repeat RT - PCR test (test was repeated after 10 days of hospital admission) The obstetric outcome was studied in the remaining 144 patients. Regarding the maternal obstetric outcome, the different outcomes that we observed were ectopic pregnancy, abortion, molar pregnancy, preterm birth (delivered before< 37 wks) and term delivery. Besides there were 2 maternal deaths due to severe COVID pneumonia. There was no case of mother to child transmission found in our study.
**Conclusion:** No evidence of ver- tical transmission during pregnancy and delivery was found. However, the possibility of this cannot be excluded.

**Keywords:** COVID 19 infection, transplacental transmission, pregnancy outcome

## Introduction
During pregnancy the immune system is altered, which predisposes to respiratory viral infec- tions [1]. COVID' 19 caused by SARS COV2 is highly infectious disease and has spread rapidly almost around the globe. Since the emergence of SARS-CoV-2 in Wuhan, Hubei Province, China during December 2019, it has caused thousands of morbidities and mortalities around the globe. In course of pregnancy transverse diameter of the thorax increases, diaphragm is displaced up- wards; this decreases maternal tolerance to hypoxia [2]. Moreover, alteration of the lung capacity and vasodilation may lead to swelling of the mucous membrane and increase in secretion within upper respiratory tract that contributes to development of respiratory failure [3]. Possibility of transplacental transmission of SARS-CoV-2, which may lead to negative neonatal outcomes re- mains unclear [4, 5]. Considering controversial data about the course of COVID-19 in pregnant women and neonates [6-9], evaluation of clinical manifestations, maternal and perinatal out- comes in pregnant women with COVID-19 were the main goals of this research. We conducted a study on lab confirmed COVID 19 positive pregnant women who delivered babies through vaginal route and caesarean section and intrapartum maternofetal transmission of COVID 19 during birth was studied.

## Aims and Objectives of the Study
To study the impact of COVID 19 on pregnancy outcome.
To study the risk of intrapartum fetomaternal transmission during birth.

## Material & Methods

This study was conducted at SKIMS medical college hospital, Srinagar, India, a COVID desig- nated hospital from 1st April 2020 to 31st December, 2020.The study is a prospective observa- tional study. A total number of 249 COVID '19 positive pregnant women and 130 neonates were included in the study.

### Eligibility Criteria

1. Lab confirmed COVID 19 infection using reverse transcriptase real-time PCR on speci- mens of respiratory tract (nasal and pharyngeal swabs) of pregnant patients on admission and of all neonates within 48hours of birth.
2. Availability of clinical characteristics including maternal and perinatal outcomes

### Exclusion Criteria

Cases of suspected COVID 19 infection not confirmed by the lab test.

### Patient Information Sheet

Name Age
Obstetric History
Gestational Age at the time of admission Infected with COVID 19
Mode of delivery Vaginal or Caesarean Lab Records
WBC Count Lymphocyte count
CRP ALT AST
Neonatal Outcome Term baby Preterm delivery Abortion
Neonatal Death/Still birth
Neonate infected with COVID _19

## Results

A total of 249 COVID positive pregnant patients were included. The most common clinical fea- tures were asymptomatic patients (tested positive on routine antenatal screening, 92%), fever & cough (6%) and Upper respiratory tract infection (2%). 4 patients required ICU admission. Leukocytosis, lymphocytopenia, deranged liver enzymes and positive C reactive protein were the most common abnormal lab finding. The percentage of these can be found in table 1. Out of the total 249 COVID positive pregnant patients, 105 patients were discharged from the hospital after they turned out to be COVID negative on repeat RT - PCR test (test was repeated after 10 days of hospital admission). The obstetric outcome was studied in the remaining 144 patients. Regarding the maternal obstetric outcome, the different outcomes that we observed were ectopic pregnancy, abortion, molar pregnancy, preterm birth (delivered before< 37 wks) and term delivery. Besides there were 2 maternal deaths due to severe COVID pneumonia, 1patient was 26 weeks pregnant and other was found to COVID positive in the post LSCS period and she died on day 11th post LSCS. There was one case of near miss, primigravida at 32 weeks of gestation was admitted in hospital as a case of severe COVID pneumonia, emergency LSCS was done in the maternal in- terest. Baby was ok. Patient was given full treatment for COVID 19, including oxygen (initially she was intubated, followed by high flow oxygen via HFNC), Hydrocortisone, Enoxaparin, Piperacillin-Tazobactam, Azithromycin and Vancomycin). Eventually patient was discharged on 26th post operative day. The percentage of these can be found in Table 2

The different obstetric complications that were noticed were preeclampsia, gestational diabetes mellitus/ type 2 Diabetes mellitus, PPROM, Intra uterine growth restriction, oligo/anhydramnios and Intra uterine fetal demise. The percentage of these can be found in table 3

Out of the total 249 COVID positive pregnant patients admitted in our department, 105 were treated symptomatically and discharged, 89 delivered by cesarian section, 40 by vaginal delivery, 4 admitted to ICU, and 2 died. The percentage distribution of births by LSCS and vaginal deliv- ery can be found in pie chart 1. Out of the 129 deliveries that took place in our hospital, 13 were preterm and 116 were term gestation as shown in pie chart 2. Out of 40 vaginal deliveries, that included 11 preterm and 29 term deliveries, 11 patients were found to have precipitate labor as shown in pie chart 3. Out of 89 LSCS done in the department, 5 were category 1 LSCS (all for obstetric indications like acute fetal distress, abruption and severe preeclampsia) (5.61%), 1 LSCS was done in view of severe COVID pneumonia (1.1%) and rest were done as elective LSCS (category 2, 3 and 4) for different obstetric indications like Cephalopelvic disproportion, Cesarian delivery on maternal request (CDMR), placenta prevue and twin pregnancy). There was increased incidence of CDMR (34.83%) as the patients refused trial of labor because of the vari- ous psychosocial factors associated with COVID-19; especially as they were without any atten- dants in the labor ward and the fear of neonatal transmission due to prolonged stay in labor room. The perinatal outcomes for the 125 neonates that were taken into consideration were Apgar <7, neonate admitted to ICU, early neonatal death and mother to fetus transmission. There was no case of mother to child transmission found in our study. The percentage of these can be found in table 4.

## Discussion

### Main findings and interpretation

According to our research the rate of severe cases of novel form of coronavirus infection ac- counted for 6%. Main clinical symptoms included fever and cough (6%) and features of upper respiratory tract infection (2%); this is different from other literature reports [10, 11] as majority of our patients had asymptomatic course of COVID-19 (92%). According to several communica- tions' cesarean section was the most often method of delivery [12, 13]. In our study also, the rate of cesarian section prevailed (69%). Though our study did not demonstrate strong correlation between COVID-19 severity and adverse perinatal outcomes, possibly due to a small patient's sample and/or timely and appropriate medical care at mild/moderate stages of the disease, other publications do, however address this issue [14-16].

### Clinical implications

Main predictors of severe COVID-19 course in pregnant women were a decrease in the levels of lymphocytes and an increase in the levels of ALT and CRP; further research may contribute to better understanding of the mechanism and value of this correlation. The main cause of maternal death with COVID-19 was a severe comorbid disease.

### Research implications

In our study, all neonates were SARS-CoV-2-negative. There have been studies which have also found no evidence of the virus in the amniotic fluid and placenta (similarly to Schwartz *et al*.) [17], as well as in the vaginal discharge of women in labor; these observations may reduce the concerns of vertical transmission of the infection during pregnancy and labor, but still are subject to further investigation in larger populations.

Although we did not include the detection of COVID 19 virus in the colostrum in our study, Wu *et al*. detected virus in breast

milk by PCR [18]. Hence there is a need for the issue of the mother to baby virus transmission through breastfeeding to be carefully addressed.

Herein we demonstrate the data obtained during the "first wave" of COVID-19 in Srinagar, India, indicating that there is no risk of transmission of the virus to the babies born from the mothers infected with SARS-CoV-2 shortly before the childbirth managed with appropriate precautions. A low risk of intrauterine transmission of COVID-19 from infected pregnant women to their foe- tuses was suggested by early publications . Karimi-Zarchi reported about 31 infected pregnant mothers with COVID-19, with no infection detected in the newborns and placenta [19]. Later, several observational studies on the possibility of vertical transmission of infection during pregnancy were published [20-22].

**Strength and limitations**

Our study is the first experience in a tertiary care COVID referral centre in Srinagar, India in analysis of the clinical course of novel COVID-19 infection in pregnant women. Our study interprets the laboratory findings in relation to the clinical characteristics of the disease. The main limitations of the study were small patients' sample from one centre and the absence of compara- tive group (e.g. pregnant women with other respiratory infections).

**Table 1:** Abnormal Laboratory parameters

| Lab finding | Number of patients | Percentage distribution(%) |
|---|---|---|
| Leucocytosis | 57 | 22.89 |
| Lymphopenia | 17 | 6.82 |
| deranged liver enzymes | 61 | 24.5 |
| CRP positive | 14 | 5.62 |

**Table 2:** Different obstetric outcomes in covid 19 positive pregnant patients

| Obstetric outcome | Number of patients | Percentage distribution(%) |
|---|---|---|
| Ectopic pregnancy -medically managed | 2 | |
| Ectopic pregnancy - surgically managed | 3 | |
| Total number of ectopic pregnancy cases | 5 | 3.5 |
| Abortion- medically managed | 2 | |
| Abortion - surgically managed | 4 | |
| Total number of abortion cases | 6 | 4.2 |
| Molar pregnancy -surgically managed | 2 | 1.4 |
| preterm delivery | 13 | 9 |
| term delivery | 116 | 80.56 |
| antenatal death | 1 | 0.01 |
| Post partum death | 1 | 0.01 |

**Table 3:** different obstetric complications

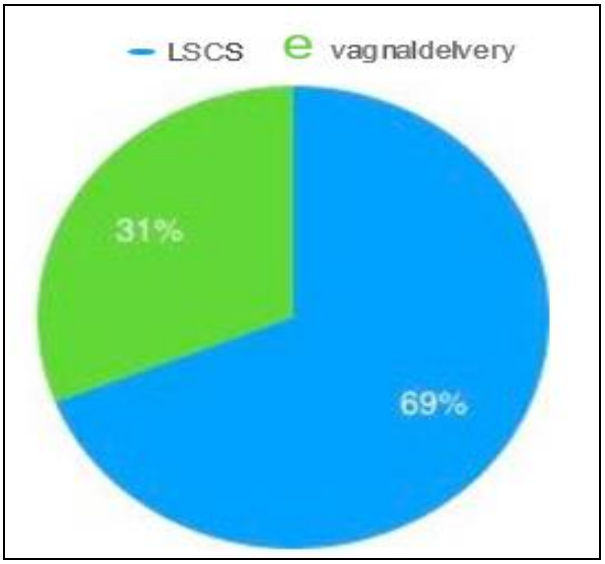
| Obstetric complications | Number of patients | Percentage distribution |
|---|---|---|
| Pprom | 7 | 4.86 |
| Preeclampsia | 13 | 9 |
| IUGR | 5 | 3.47 |
| oligo\anhydramnios | 3 | 2.1 |
| IUFD | 4 | 2.8 |
| Type2 \gestational diabetes mellitus | 22 | 15.28 |

**Table 4:** Different neonatal outcome

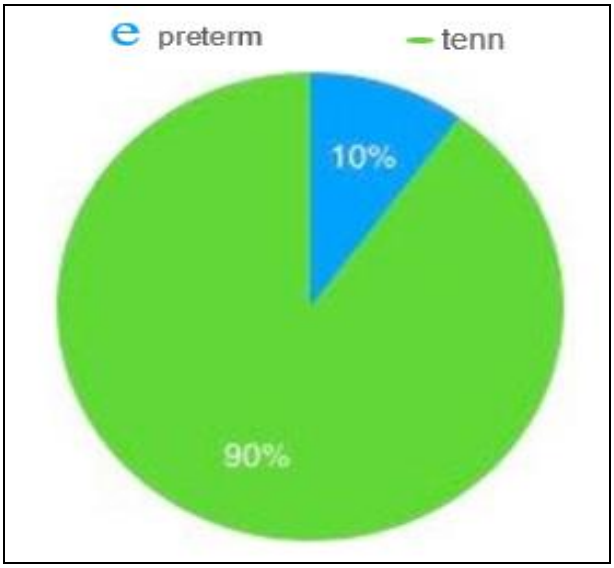
| Neonatal outcome | Number of patients | Percentage distribution |
|---|---|---|
| Apgar <7/10 | 10 | 8 |
| NICU admission | 4 | 3.2 |
| Early neonatal death | 1 | 0.8 |
| Mother to child transmission | 0 | 0 |

**Table 5:** overall descriptive statistics

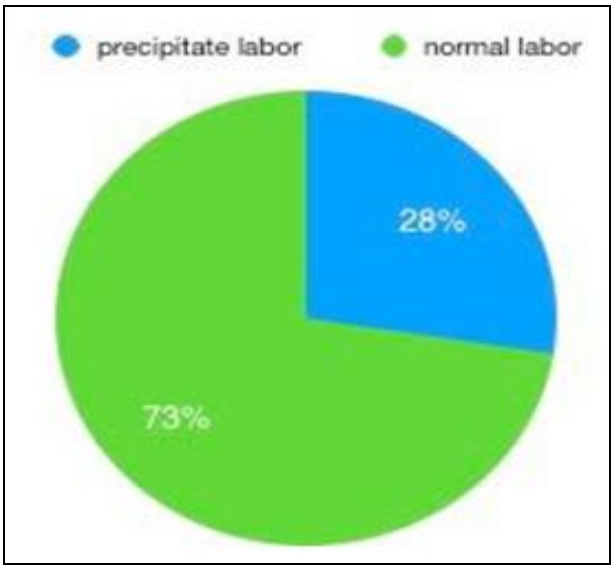
| parameter | Minimum | Maximum | Mean | Standard deviation |
|---|---|---|---|---|
| age (years) | 23 | 34 | 30.04 | 2.58 |
| WBC (* 10^3) | 4 | 18 | 9.91 | 3.24 |
| Lymphocytes (%) | 10 | 45 | 24.18 | 5.64 |
| AST | 28 | 224 | 61.24 | 47.56 |
| ALT | 27 | 300 | 69.43 | 62.61 |
| Gestational age (weeks) | 6 | 39 | 31.01 | 9.80 |




**Pie chart 1:** The percentage distribution of births by LSCS and vaginal delivery can be found in pie chart 1




**Pie chart 2:** Out of the 129 deliveries that took place in our hospital, 13 were preterm and 116 were term gestation as shown in pie chart 2.




**Pie chart 3:** Out of 40 vaginal deliveries , that included 11 preterm and 29 term deliveries , 11 pa- tients were found to have precipitate labor as shown in pie chart 3

## Conclusion

Mostly, the manifestations of COVID-19 were mild. However, 6% of them developed pneumo- nia and could contribute to abortion, preterm delivery or maternal and fetal morbidity. A critical clinical status was noted in 1.2% patients. Main predictors of severe COVID-19 course in preg- nant women were increase in total leucocyte count, decrease in the levels of lymphocytes and increase in the levels of alanine aminotransferase and CRP. COVID-19 infection caused higher incidence of premature labor in pregnant women. Also, there seems to be a more incidence of precipitate labor. The rate of cesarian section has increased due to COVID-19 infection. No evi- dence of vertical transmission during pregnancy and delivery was found. However, the possibili- ty of this cannot be excluded

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