

Maternal and Perinatal Outcomes in Covid-19 Infected Pregnant Women: A Study From Tertiary Health Care Institution

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Abstract Introduction: At the onset of the pandemic, there was insufficient data to understand if the clinical features of COVID-19 infection in pregnancy differed from those in the general population and if pregnancy and labor aggravated the symptoms of such infection. However, studies conducted later have shown that COVID-19 infected pregnant women were at a higher risk for obstetric complications, required more mechanical ventilation and intensive care unit (ICU) admissions, and had a higher mortality rates compared to non-infected expectants. **Material and Methods:** A cross-sectional observational study was conducted by the Department of Obstetrics and Gynecology, in collaboration with the Department of Radiodiagnosis, ESIC Medical College and hospital between April 2020 and December 2021. All pregnant women who were tested positive for COVID-19 infection, irrespective of symptoms at the time of or after admission, who delivered at our center and who consented were included in the study. **Results:** Out of the 4127 deliveries conducted during the study period, 164 (3.97%) were tested COVID-19 positive. In our study, 24/164(14.6%), 22/164(13.4%), 14/164(8.5%) had hypothyroidism, hypertension and gestational diabetes respectively. Results of maternal outcomes showed missed abortions in 1.8% study women, ectopic pregnancy in 1.2%, preterm delivery in 9.4%, and prelabour rupture of membranes in 12.4% women . 5/164 (3%) women had Intrauterine fetal death at admission and 4.8% required ICU admissions. There was one maternal death reported in our study. **Conclusion:** Most of the instances that were reported did not show evidence of maternal-fetal transmission of the SARS-CoV-2 virus, although one newborn who was kept apart from the mother for 36 hours after delivery tested positive for the virus using qRT-PCR. It is necessary to closely monitor pregnancies with COVID-19 and take precautions against newborn infection.

Key Words maternal outcomes, perinatal outcomes, Covid-19, pregnant women

1. Introduction

COVID-19 infection affected globally with approximately 5,00,000 deaths in Low middle-income countries (LMIC) [1], [2]. There were 245, 373, 039, and 34,285,814 cases and 4,979,421 and 458, 437 deaths due to COVID-19 infection globally and in India respectively [3].

At the onset of the pandemic, there was inadequate data to understand if the clinical features of COVID-19 infection in pregnancy differed from those in the general population and if pregnancy and labor aggravated the symptoms of such infection [4]. However, studies conducted later showed that pregnant women with COVID-19 infection were at a high risk for obstetric complications severe disease, mechanical ventilation requirement, intensive care unit (ICU) admission, and had more mortality rates [5]–[7]. In addition, it was also

evidenced that pregnant women infected with new variants of SARS-CoV-2 had a poorer prognosis compared to the old variants [8]–[16].

The adverse obstetric and perinatal outcomes due to COVID-19 infections have been attributed to physiological changes in the immune system, changes in lung volumes, and vasodilatation leading to mucosal edema during pregnancy [17]. However, it was found that pregnancy per se did not increase the risk of contracting the disease [18].

Studies have shown that disruptions in access to healthcare services in limited resource settings [19]. Poor clinician-patient ratio were the contributing factors affecting the quality of care provided to the COVID-19 infected pregnant during the pandemic. Despite effective health policies, stringent legal regulations, and widespread immunization programs,

COVID-19 infection still posed challenges in the pregnant population due to the emergence of new strains [20]–[23]. Hence this study was conducted to

- 1) Estimate the prevalence of COVID-19 infection in pregnancy.
- 2) Assess the maternal and perinatal outcomes in COVID-19-infected pregnant women.
- 3) Find an association between sociodemographic variables and maternal and perinatal outcomes.

A. Preparedness for antenatal care at the study site during the Pandemic

It was made mandatory to strictly follow the WHO guidelines for the investigation, and management of suspected cases of COVID-19 infection. All universal precautions were followed. Expectants were advised of minimum antenatal visits at 12, 20, 28, and 36 weeks of gestation to avoid the risk of catching infection. Routine antenatal and gynecological services were delivered through teleconsultation. A dedicated maternity ward and operation theatre was allotted to the infected women.

A multidisciplinary approach including an obstetrician, intensivist, pediatrician, radiologist, microbiologist, and anaesthesiologist, for fetal surveillance of COVID-19-infected women, was practiced at the study site. Though induction of labor was deferred, all COVID-19-positive women admitted to spontaneous labor were given a trial of labor. COVID-19 infection per se was not an indication for Cesarean delivery. Following delivery, nasopharyngeal swabs were obtained from the neonates and subjected to a quantitative Reverse Transcriptase Polymerase Chain Reaction (qRT-PCR) kit testing for SARS-CoV-2. Breastfeeding was advised in accordance with WHO recommendations.

2. Material and Methods

A cross-sectional observational study was conducted by the Department of Obstetrics and Gynecology, in collaboration with the Department of Microbiology, Radiology, ESIC Medical College, and Hospital between April 2020 and December 2021.

A. Inclusion criteria

All pregnant women who had a laboratory-confirmed positive q(RT-PCR) test (considered a case), irrespective of symptoms at the time of or after admission, who were delivered at our center, and who consented were included in the study.

B. Exclusion criteria

Pregnant women with clinical features suggestive of COVID-19 but q(RT-PCR) negative were excluded from the study.

C. Data collection tools

After reviewing the literature, and peer and expert review, a self-designed questionnaire was made, validated, and used for data collection. (Cronbach's alpha score was 0.82). The

questionnaire included details about the socio-demographic variables of the study subjects, their obstetric history, the clinical symptomatology at admission and during their stay in the hospital, investigations done, and treatment they received. The questionnaire also included obstetric details like ultrasonographic findings, maternal and fetal surveillance, gestational age at delivery, and maternal and perinatal outcomes. Documented maternal outcomes included gestational age at delivery, mode of birth, indication for cesarean section, and problems throughout the antepartum, intrapartum, and postpartum phases of the pregnancy. It also included the non-obstetric complications the mother developed and the treatment she received. Neonatal outcomes studied included birth weight, APGAR scores, RT PCR positivity, complications developed, and NICU admissions.

D. Institutional Ethical Clearance

The study was approved by the institutional ethics committee (ESICMC/SNR/IEC-F336/09/2021 version number V01).

E. Statistical method

The data collected was coded and entered on a Microsoft Excel sheet and stored in a password-protected computer. Descriptive statistics like percentage and mean, standard deviation were used to analyze the quantitative data, and paired t-tests and one-way ANOVA for comparisons.

3. Results

Out of 4127 deliveries conducted during the study period, 164 (3.97%) q RT PCR positive. The age of the study participants ranged between 18 to 38 years with a mean age of 28 years. Out of 164 participants, 96(58.5%) were primigravida. 158/164 (96.4%) presented in the third trimester.

103 out of 164 women (63%) were asymptomatic at admission, 54 (33%) had mild and 7 (4%) had severe symptoms suggestive of COVID-19 infection. The symptoms ranged from mild cough to severe dyspnea.

The sociodemographic details of the study participants, the symptoms at presentation, and associated comorbidities are detailed in Table 1, Table 2, and Table 3 respectively.

The study of maternal outcomes showed that 3/164 (1.8%) women who presented in the first trimester had missed abortion. Ectopic pregnancy was reported in 2 (1.2%) women, 15 (9.4%) of the COVID-positive women had preterm delivery and 20 (12.4%) had pre-labor rupture of membranes. 5 (3%) out of 164 women had an Intrauterine fetal demise at presentation, 8(4.8%) required ICU admissions for COVID-related pneumonia and required ventilatory support. There was one maternal death reported in our study. The other details of maternal outcomes are shown in Table 4.

Out of 164 participants, 144(90.5%) delivered at term and 107(67%) had Caesarean section. The indications for Caesarean are shown in Figure 1.

The details of the treatment received by the study participants after admission are detailed in Table 5.

Sociodemographic details	Number (%)
Age group (years)	
a) <20	8(4.8%)
b) 21-25	53(32.4%)
c) 26-30	79(48.3%)
d) >30	24(14.5%)
Gravid status	
a) Primigravida	96(58.5%)
b) Multigravida	68(41.4%)
Stage of presentation	
a) First trimester	06 (3.6%)
b) Second trimester	00 (0%)
c) Third trimester	158 (96.4%)
Clinical presentation	
Asymptomatic	103(63%)
Mild symptoms	54(33%)
Severe symptoms	7(4%)
History of contact with infected person	
a) Yes	46(28%)
b) No	118(.72%)

Table 1: Sociodemographic details of the study participants(n=164)

Symptom associated	Number (%)
Cough	34 (20.7%)
Fever	26 (15.8%)
Myalgia	16 (9.7%)
Sore throat	12 (7.3%)
Dyspnea	7 (4.2%)

Table 2: Symptoms associated with Covid 19 positive status(n=164)

Comorbidity identified	Number (%)
Hypothyroid	24 (14.6%)
Hypertension	22 (13.4%)
Gestational Diabetes	14 (8.5%)
Obesity	8 (4.8%)
Asthma	4 (2.4%)
Total	72 (43.9%)

Table 3: Comorbidities identified in the study population(n=164)

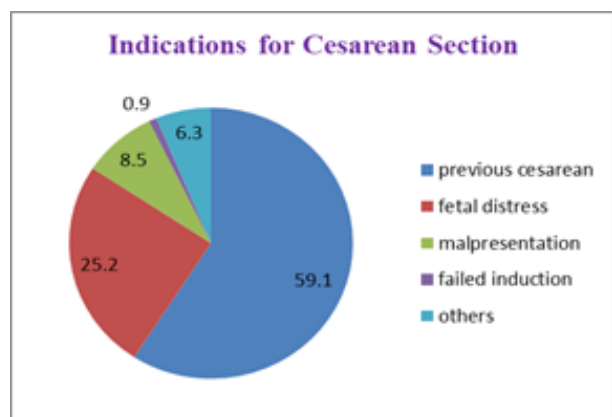


Figure 1: Indications for Caesarean Section among the study participants

Obstetric outcome	Number of patients (%)
Antenatal complications	
a) Miscarriage	3 (1.8%)
b) Ectopic	2(1.2%)
c) Gestational Hypertension	22(13.4%)
d) Gestational Diabetes	14(8.5%)
e) Intrauterine fetal death	5(3%)
Gestational age at delivery	
a) Term	144(90.5%)
b) Preterm	15(.9.4%)
c) PROM	20(12.4%)
Route of delivery	
a) Normal delivery	52 (33%)
b) Caesarean delivery	107(.67%)
Intrapartum complications	None
a) Hemorrhage	None
b) Need for blood transfusion	None
Postpartum Complications	None
ICU admissions	8(4.8%)
Type of ventilation required	
a) High flow oxygen	6
b) Ventilator	2
Maternal Mortality	1(0.64%)
Referral rate to higher centers	0 (0%)

Table 4: Obstetric outcomes observed in the study participants(n=164)

Treatment received	Number (%)
Antibiotic	164 (100%)
Antiviral	4(2.4%)
Corticosteroids	6 (3.6%)
Hydroxychloroquine	0 (0%)
Oxygen support	10(6.1%)
LMW Heparin	18 (11%)
ICU admission	8(4.8%)
Tocilizumab	0 (0%)

Table 5: Treatment received by the study participants during the stay at hospital(n=164)

There were no reported stillbirths reported in our study. The birth weight of the newborns ranged between 1.5-4kg. 16 of 164 (9.75%) delivered babies were admitted to neonatal intensive care, the reasons being prematurity 6 (3.6%), respiratory distress 4(2.4%) & neonatal jaundice 8(4.8%) Out of 164, 3(1.8%) neonates were tested q(RT PCR) positive. Breastfeeding was promoted in all positive women. The other neonatal outcomes are depicted in Table 6.

Neonatal outcome	Number (%)
Birth weight (in Kilograms)	
a) >3	90(56.6%)
b) 2.5 to 2.9	58(37.7%)
c) <2	11(5.8%)
APGAR Score	
a) 7-10	145(94.4%)
b) 4-6	9(5.6%)
NICU admission	16(10.4%)
Neonatal swab positivity	3 (1.8%)

Table 6: Neonatal outcomes in Covid positive antenatal women(n=164)

4. Discussion

In our study patients' age ranged from less than 20 to more than 30 years, with the maximum number of patients (48.3%) in the age group of 26-30 years followed by 21-25 years (32.4%) and more than 30 years (14.5%), whereas the mean maternal age was 30.8 years (range 24-41 years) in a study by Yan et al [27]. Primigravida were 58.5% while multigravida were 41.4%. Similarly to this, in a study by Gupta et al., 19 (51.4%) women were primiparous and 18 (48.6%) were multiparous [28].

In this study, there were 158 deliveries in the third trimester (96.4%) and 6 in the first trimester (3.6%). According to research findings, women who contract SARS-CoV-2 during their third trimester of pregnancy are at much higher risk of experiencing a preterm birth (PTB). These findings are in line with a number of earlier research conducted on COVID-19-positive pregnant women who were nearing or had given birth [29]. Due to limited sample numbers, other studies did not find any unfavorable pregnancy outcomes for these women [30]. In line with earlier research, [31]. individuals who were infected during the third trimester and had symptomatic COVID-19 had a notably elevated risk of PTB. An further analysis of PTB revealed that the incidence of induced labor was greater in third-trimester infected women than in matched non-infected women. This finding raises the possibility that physicians were more likely to induce SARS-CoV-2-infected women who were close to finishing their pregnancies [32].

Out of 164 women, 103 (63%) were asymptomatic at admission, 54 (33%) had mild, and 7 (4%) had severe symptoms suggestive of COVID-19 infection. Fever was reported only in 15.8% of our study subjects and previous studies have also shown similar results and concluded that not all patients who are COVID-19-positive have fever [33]. Because of this, it is crucial to monitor COVID-19 individuals who do not have a temperature as a source hint of infection. If the monitoring system just looks for fever in patients, some people would go unnoticed [34]. In this study, symptoms including diarrhea, myalgia, dyspnea, and sore throats were less prevalent, and the outcomes are comparable to those seen with other viruses like SARS [35].

Our study showed that 73.78% of COVID-19-positive antenatal women delivered vaginally and 26.21% had a Cesarean section. These findings are in contrast to the results of Singh et al., where the Cesarean section and vaginal delivery rates were 67% and 33% respectively [30]. A few other studies have also observed high Cesarean rates in COVID-19-infected pregnant women [31]. Prior Cesarean scar (40%), followed by fetal distress (30%) were the commonest indications for Cesarean section in our study whereas several authors cited fetal distress as the reason behind the decision [33]. Our study found a reduction in Cesarean section rates which could be attributed to better healthcare practices. Out of 164 deliveries, 154(94%) women had live births with 5(3%) reported intrauterine fetal demise. There were no reported stillbirths in our study. The birth weight

of the newborns ranged between 1.5-4kg (10.4%). 16 of the delivered babies were admitted to Neonatal Intensive Care. The most common reasons for such admissions were prematurity 6 (3.6%) respiratory distress 4(2.4%) & neonatal jaundice 8(4.8%) Out of 164, only 3(1.8%) neonates were tested COVID RTPCR positive. Breastfeeding was promoted and encouraged in all the cases.

The study makes it abundantly evident that the epidemic has had an impact on expectant mothers and their babies, and it is the responsibility of the academic community, medical professionals, and legislators to draw conclusions from it. Humanitarian crises frequently have a negative impact on women's healthcare, and our research shows how crucial it is to plan for strong maternity services in any emergency response. The swift reorganization of maternity care has demonstrated that, with coordinated funding and scientific investigation, it is possible to accomplish better distant care, shorter hospital stays, and even seemingly unsolvable and deeply ingrained issues.

5. Conclusion

Most of the instances that were reported did not show evidence of maternal-fetal transmission of the SARS-CoV-2 virus, although one newborn who was kept apart from the mother for 36 hours after delivery tested positive for the virus using qRT-PCR. It is necessary to closely monitor pregnancies with COVID-19 and take precautions against newborn infection. By using virtual clinic sessions where feasible, clinicians will need to strike a balance between the requirement for routine multidisciplinary prenatal care to manage women with pre-existing comorbidities and the avoidance of needless virus exposure. It may be necessary to handle pregnant patients with COVID-19 before term gestation in a unit equipped to care for premature newborns.

Conflict of interest

The authors declare no conflict of interests. All authors read and approved final version of the paper.

Authors Contribution

All authors contributed equally in this paper.

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